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Further Observations on the Nesting Habits of Cerceris nigrescens Smith (Hymenoptera: Sphecidae).

By Karl V. Krombein, Buffalo, N. Y.

The following notes on *Cerceris nigrescens* Smith, made in September 1936 in Forest Lawn Cemetery, Buffalo are a continuation of my observations of this species during 1934.[1] Mr. Henry Dietrich of Cornell University has been kind enough to determine the weevils.

Cerceris no. 2. Entrance of burrow open and surrounded by a mound of pellets of earth about three-eights of an inch in height and an inch and one half in diameter. Burrow ran down at an angle of 85° from the horizontal to the one and one half inch level and then at an angle of 45° to the three inch level. The burrow ended at this depth and contained no weevils.

Cerceris no. 3. Entrance of burrow open and surrounded by a cone of pellets three sixteenths of an inch high and one inch in diameter. Burrow descended for one inch vertically and opened into a cell three quarters of an inch long at an angle of 45°. The cell contained three *Sitona hispidula* Fabr., the clover-root curculio, and the wasp continued to bring in more weevils after I excavated the burrow.

Cerceris no. 4. Entrance of burrow plugged with earth for an eighth of an inch from the surface and without a cone of pellets. The burrow (including the cell) extended to a depth of an inch and one half at an angle of 85° from the horizontal and contained two *Sitona hispidula.*

Cerceris no. 5. Entrance open and not surrounded by a mound of pellets. Burrow descended for half an inch at an angle of 85° from the horizontal, then at an angle of 45° for

[1] Krombein, Karl V. Biological Notes on Some Solitary Wasps. (Hymenoptera: Sphecidae). Ent. News XLVII: 93-99, 1936.

three-quarters of an inch and then back at a right angle for another inch. Two cells ending at the three inch level, at a 45° angle to the horizontal and at right angles to each other were connected with the main burrow by short passages. One cell was completely stocked and held twenty-five *Gymnetron antirrhini* Payk. and a tiny wasp larva while the other cell contained two weevils of the same species.

Cerceris no. 6. Wasp captured while flying with a *Gymnetron* species (?).

Cerceris no. 7. Wasp captured while flying with a *Sitona hispidula.*

Cerecris no.'s 8-10. Burrow entrances open and two of them surrounded by a cone of pellets. General form of burrow as in no. 3 but no weevils were found in any of the nests.

The shape of the burrow appears to be quite constant and is the same as that figured by the Peckhams[2] for *Cerceris nigrescens.* The only exception was the *Cerceris* no. 5 where the burrow had one extra angulation. The cone of earth around the entrance to the burrow is lacking as often as it is present. There is no correlation here with the species of prey stocked since burrows 4 and 5 lacked a cone but contained different weevils. Certainly those burrows having the cone resemble the entrance to an ant's nest very much. Probably this is not the effect of a studied mimicry on the wasp's part but rather an indication that some of the *Cerceris* are a bit lazier.

Ordinarily the entrance to the burrow is not closed while the wasp is absent but one burrow (no. 4) had an earthen plug at the entrance. It is certainly a lack of foresight on *Cerceris* part leave the entrance open since she is much troubled by *Senotainia trilineata* V. d. W., the Miltogrammine inquiline, which follows her around and is apparently the cause of the wasp's wariness in entering her burrow. I have seen *Senotainia,* tired of shadowing a *Cerceris,* give up the chase and wait for the wasp at her burrow. As soon as the wasp reappeared the fly again took up the chase.

[2] Peckham, G. W. and E. G. On the Instincts and Habits of the Solitary Wasps. Wisconsin Geol. and Nat. Hist. Surv. Bull. 2: Pl. VIII, Fig. 6, 1898.

The weevil is carried well toward the wasp's head during flight. The Peckhams state that the prey is held in the mandibles but I have never been able to get close enough to a flying wasp to verify this. The weevil is held by the mandibles alone when the wasp is on the ground.

I have recorded four species of weevils—*Sitona hispidula, Gymnetron antirrhini, Gymnetron* species and *Hyperodes delumbis* as prey of *nigrescens* but apparently an individual wasp uses only one of these species in all her provisioning. Mr. John G. Franclemont has taken one of these wasps at Chafee, New York (September 13, 1935) carrying a *Sitona hispidula.* In all probability *nigrescens* stocks her nests with this clover-root curculio over a large portion of its range and must be an important secondary factor in the control of the beetle since at least a dozen weevils would be necessary to bring one wasp larva to maturity.

In my previous paper I indicated that *nigrescens* is a colonial species. This contention was borne out by my observations this year. After two years the wasps were still nesting in the identical area and the population had not increased appreciably. A spirit of toleration pervades the colony and there is no stealing of prey from the rightful owners such as has been recorded for various species of *Bembix* which also live in communities.

An Annotated List of The Butterflies of Nebraska, with the Description of a New Species. (Lepid.: Rhopalocera).

By R. A. Leussler, Omaha, Nebraska.

As no list of Nebraska butterflies has been published for more than 40 years (H. G. Barber's list in the 1893 Proceedings of the Nebraska Academy of Science) and as many additional species have since been taken in the state, and more definite records are at hand in the case of others, there appears to be ample justification for a list at this time.

The writer has collected butterflies in Nebraska for 28 years, keeping careful field notes during the active season and com-

piling them at the end of each season. Others who have collected in the state during this time and the result of whose collecting has contributed to the data contained herein, are:

Dr. Robt. H. Wolcott, who greatly assisted the writer at all times, and who but for his death in 1934 would have joined in the authorship of this list; Frank H. Marshall, Frank H. Shoemaker, Dr. R. W. Dawson, C. E. Mickel, and L. M. Gates.

Earlier collectors who have added material of their collecting to the collection of the University of Nebraska are: Prof. Lawrence Bruner, Merritt Cary, and J. C. Crawford.

Professor Myron H. Swenk, head of the Department of Entomology, University of Nebraska, generously granted access to the University collection as well as to the library of the department, making possible examination and study of a large number of specimens collected in the state.

The present list includes 159 species. Although this is a rather large number of species to record from one state I feel confident that many more species are to be found in Nebraska, and that when the state has been more fully covered a number of species which have not hitherto been credited to the state will be added to the list.

This rather extensive butterfly fauna is to be accounted for by a variety of causes: 1). Geographical location, being midway between the East and West, and also between the North and South. 2). Extensive area. Nebraska covers some 400 miles east and west, and 200 miles north and south. 3). Range of altitudes, varying from less than 1000 feet along the Missouri river to approximately 5000 feet in Banner county adjacent to the Wyoming line. 4). Diversity in the character of country, there being woodland, prairie, sandhills, plains, pine woodland and rocky canyons. 5). Proximity of the Rocky Mountains, accounting for the presence of mountain forms in the western part, as gaps in mountains permit these forms to find their way through.

Only such species are included in the list as have been collected within the state by the writer or by others where the specimens have actually been examined by him.

The classification followed is that of Barnes & Benjamin's Check List of 1926.

Where not otherwise noted the records refer to captures by the writer.

Hesperia pahaska n. sp.

On the high plains of the canyon region in Sioux County, Nebr., there flies a skipper which has passed under various names but which differs from all the named forms. An examination of the genitalia indicates that it is distinct. I propose for it the name *pahaska,* the name the Sioux Indians bestowed upon Col. Wm. F. Cody (Buffalo Bill), who killed Chief Yellow Hand in single combat in War Bonnet Canyon, upon the rim of which this skipper flies. "Pahaska" in the Sioux language means "White Chief".

Male, upper side: Primaries, a somewhat faded or washed-out-looking fulvous, broad dark border on outer margin not very clearly defined; fulvous apical spots within the border rather pale; stigma curved and fairly heavy, scales beneath stigma shading it and making it appear heavier than it really is. Secondaries, fuscous with a single pale fulvous spot toward base, and an outer curved row of similar pale fulvous spots. Fringes dirty white. Under side: Primaries paler than above, inner margin very pale; apical spots of upper side reproduced, but in color they are a dirty white. Secondaries, ground color an uncertain shade of yellowish brown, the inner margin, however, broadly yellow; the spot in basal area larger than on upper surface, and somewhat bifid; above this, near costa, a linear light spot; outer row of spots consists of 6 irregular shaped spots fairly separate, the one nearest inner margin projecting inwardly. All spots faintly silvered. Expanse 36 mm.

Female, pattern similar to male but fulvous area greatly restricted; apical spots of primaries whitish. Fringes dirty white. Under side similar to that of the male. Expanse 40 mm.

The above is a description of the ♂ holotype and the ♀ allotype, selected from a series of 7 males and 6 females as being representative examples. The entire series is from the canyon region of Sioux County near the town of Harrison, NEBRASKA.

♂ *Holotype* July 15, 1917. ♀ *Allotype* July 19, 1917, both in the collection of the writer. 6 ♂ *paratypes,* June 22, 24,

1911. July 17, 18, 19, 22, 1917. 5 ♀ *paratypes,* June 27, 1911. July 16, 19, 19, 22, 1917.

This species is nearest *viridis* Edw. Compared with that species it is duller, more sordid or washed-out-looking, with the spots paler and consequently more contrasting. The fringes also are lighter, and the male stigma is heavier and shaded beneath, as stated in the description. On the under side the primaries are less reddish than in *viridis,* the secondaries darker, and the spot nearest inner margin projects inwardly, whereas in *viridis* this spot lies nearer the outer margin than the spot next to it.

R. C. Williams, who made a slide of the genitalia in 1923, wrote that while the maculation is like *viridis,* the male genitalia is different from that species, and added: "it seems to me you either have a good species or a valid form to describe."

1. PAPILIO PHILENOR L. Rare. Has been taken at Omaha, Lincoln and Roca. Larvae have been found on Dutchman's pipe vine (*Aristolochia sipho*) in June and in August, and reared to maturity, the butterflies emerging in July, October and in May of the year following pupation.

2. P. AJAX L. (ASTERIUS Cram.). Apparently found over the entire state. Common at Omaha and Lincoln. First brood May and June; second brood from the middle of July to first part of September.

P. AJAX form CURVIFASCIA Skin. A number of overwintering chrysalids, produced by larvae found on parsley at Omaha, gave forth imagoes of this form, while others gave forth imagoes of the typical form.

P. AJAX form AMPLIATA Men. Out of a large number of *ajax* larvae reared at Omaha there was obtained 1 male and 1 female of *ampliata.*

P. AJAX ab. ALUNATA Skin. & Aar. One specimen of this aberration in the Nebraska University collection. Taken in Squaw Canyon, Sioux County, July, 1892.

3. P. BAIRDII Edw. Four specimens in the University collection, all collected in Sioux County. July, 1892, June, 1900; July 29, 1913; August 15, 1913.

P. BAIRDII form BRUCEI Edw. Found in the western part of the state, where it appears to be more common than the typical form. Sioux County July, 1892 (Univ. coll.); Haigler Aug. 19, 1909 (Gable); Colfer Aug. 18, 1912 (Shoemaker); Wauneta, July 27, 1923 (Leussler).

4. P. NITRA Edw. Rare. One male Bull canyon, Wild Cat Mtns., near Harrisburg, Banner County, June 2, 1919 (Leussler).

5. P. INDRA Reak. Rare. One specimen from W. Monroe Canyon, Sioux County, May 31, 1900 (Univ. coll.); 1 from Bull Canyon, Harrisburg, Banner County, June 2, 1919 (Leussler).

6. P. CRESPHONTES Cram. Not uncommon in the eastern part of the state and has been taken as far west as Kearney. First brood latter part of May through June; second brood August and September. Larvae in numbers can be found at Omaha on prickly ash in September.

7. P. GLAUCUS L. Black females are found commonly in the eastern part of the state during May and June, and again during July and August. Observed and collected at Omaha every year.

P. GLAUCUS form TURNUS L. The commonest *Papilio* in the eastern part of the state. First brood early May; second about the middle of July. Some individuals of the early brood closely resemble race *canadensis* R. & J., in having the yellow submarginal spots on under side of primaries united into a band and in being considerably smaller than individuals of the later brood.

8. P. MULTICAUDATA Kirby. Abundant in the western part of the state, especially in Sioux County where it is the common *Papilio*. Specimens of both sexes taken there in the latter part of June were already more or less worn, suggesting that the species makes its appearance in late May or early June. Specimens also collected at Valentine June 9, 1914, and one was taken a few miles south of Omaha May 1, 1910, by Dr. Wolcott. Apparently double brooded as the University collection contains a specimen taken in Sioux County July 20, 1892.

9. P. TROILUS L. A single specimen taken near Omaha April 27, 1913; it had the appearance of having travelled a long distance, as its wings were badly mutilated although the colors were fresh.

10. P. PALAMEDES Dru. Rarely visits Nebraska. One individual observed at Omaha (Leussler); one taken in Dodge County by the late E. A. Dodge and now in the writer's collection. Barber's list credits it also to Lincoln.

11. P. MARCELLUS Cram. form TELAMONIDES F. & F. Rare. One specimen, near Omaha, April 3, 1910.

P. MARCELLUS form aest. LECONTEI R. & J. Rare. Observed occasionally at Omaha during late June and July (Leussler) and at Lincoln (Wolcott). One specimen in University collection bearing Rulo locality label, no date. Rulo is in the extreme southeastern corner of the state, and as papaw, the food plant, is known to occur in that part of the state it is likely that this butterfly is not uncommon thereabouts.

12. PARNASSIUS SMINTHEUS Dbldy & Hew., race SAYII Edw. Common in the northwestern part of the state. Long series have been collected on the ridges and canyon slopes in Sioux County, about 8 miles northwest of the town of Harrison. Much variation in the number and size of red spots is noted. Most of the males have a submarginal row of black crescent-shaped spots on secondaries, heavy and distinct in some, and but faintly indicated in others. In some specimens the red spots are replaced by spots of an orange tint, varying in degree from slight to very pronounced.

13. NEOPHASIA MENAPIA (F. & F.). Found in the canyons of Sioux County, where, on the pine-covered slopes it is reported to be common. I have specimens taken there August 14, 1911 (F. H. Shoemaker) and August 18, 1912 (R. W. Dawson).

14. APPIAS ILAIRE (Godt.) race NEUMOEGENII (Skin.). A single tattered specimen, taken at Omaha, August 19, 1909, following ten days of steady southeast wind; clearly a straggler. It is a male and has the stiff brush-like clusters of hair attached to the abdominal claspers, leaving no doubt as to identification.

15. ASCIA SISYMBRII (Bdv.). Apparently found only in the western part of the state, and not common there. 2 specimens, Sioux County, 1900 (Wolcott).

A. SISYMBRII ab. ♀ FLAVA (Edw.). One specimen of this yellowish female, Monroe Canyon, Sioux County, June 5, 1919 (Leussler).

16. A. PROTODICE (Bdv. & Lec.). Common over the entire state, though less so than *rapae*. In the eastern part of the state it is on the wing from May till October.

A. PROTODICE gen. vern. VERNALIS (Edw.). Less common, but specimens of this form, small in size, lightly marked on upper surface, and with the veins on under side of secondaries heavily fuscous, can be taken at Omaha and Lincoln in late March and April. *Protodice,* taken late in October often shows considerable darkening of veins on under side of secondaries but otherwise is more like the typical form.

17. A. RAPAE (L.). The spring form, the males of which are sometimes almost immaculate, is fairly common in the eastern part of the state, and probably in other parts as well. April and May.

A. RAPAE gen. aest. YREKA (Reak.). Exceedingly common; found everywhere and at all times during the summer and fall.

18. NATHALIS IOLE Bdv. Very plentiful, sometimes actually swarming at Omaha, and apparently just as common all over the state, for I have taken it at many points in every quarter of the state. Two broods at least, first early July, second early September, continuing on the wing until cold weather. In some females the ground color of secondaries is pure yellow while in others it is decidedly orange.

(To be continued)

A List of Dragonflies taken during the Summer of 1936 in Western United States. (Odonata).

BY CARSTEN AHRENS, McKeesport High School,
McKeesport, Pennsylvania.

During the summer of 1936, the writer had the good fortune to be selected as a student in the Yosemite National Park

School of Field Natural History which is conducted in California by the Department of the Interior. On the trip west by automobile, collecting was attempted wherever climatic and topographical conditions were favorable. The trip to and from California was hastily made; there was little time allowed for collecting. Most of the insects taken were netted from vicinities close to the highways, or actually captured along the road.

A total of seven weeks was spent in Yosemite National Park where a preliminary check-list of the dragonflies of the area was made. During these weeks, 38 species were collected in Yosemite, and since the dismissal of school, this list and specimens have been accepted by the officials of the museum there. Five species of the dragonflies collected in Utah are new records for the state. They are: *Anax walsinghami* McLachlan, *Brechmorhoga mendax* Hagen, *Hyponeura lugens* Hagen, *Ischnura demorsa* Hagen, *Ischnura damula* Calvert.

I wish to express my appreciation to Mrs. L. K. Gloyd of the University of Michigan Museum, Ann Arbor, Michigan, for her cheerful and expert help in identifying species; to Prof. Frederick M. Gaige who permitted me to make use of the laboratory and specimens of this museum; to Mark Leslie for his skillful assistance in collecting; and to Claudeous Brown with whom I corresponded regarding the specimens collected in Utah. The arrangement of species used by Needham has been followed in this paper.

ANISOPTERA.

1. TANYPTERYX HAGENI Selys. Two males taken along Snow Creek, 7000 feet*, in Y. N. P.** July 21. One female in the same vicinity, August 4. The insects have the same habits which the author noticed in *Tachopteryx thoreyi* Hagen, in Cades Cove, Tenn. The dragonfly will flatten itself against the surface of a rock or tree from which it will make sudden sallies after passing insects, and then return to the favorite perch.

2. PROGOMPHUS BOREALIS McLachlan. 9 males and 1 female collected along a little, rocky stream near Washington,

*The altitude is given when it is considered significant.
**Y. N. P., Yosemite National Park.

Utah, August 14. The insects made short flights, alighting frequently on rocks protruding from the water or upon the sandy margin of the stream.

3. HAGENIUS BREVISTYLUS Selys. 2 males and 1 female, near Lebonon, Missouri, August 21.

4. OPHIOGOMPHUS BISON Selys. A female acquired where Meadowbrook is crossed by the Pohono Trail, Y. N. P. (6000) June 30.

5. ERPETOGOMPHUS DESIGNATUS Hagen. Near Lebanon, Missouri on August 21, a male was captured with a male *Hagenius brevistylus*. The *H. brevistylus* had struck and seized the *designatus* with such force that both were carried into the water. Both were dipped from the river an instant after they struck the surface.

6. F. COMPOSITUS Hagen. Two males on August 13 and 14; one near Glendale, Arizona, the other near Washington, Utah.

7. GOMPHUS EXTERNUS Hagen. One male near Prophetstown, Illinois, June 9.

8. G. AMNICOLA Wash. One male near Prophetstown, Illinois, June 9.

9. G. VASTUS Walsh. One male near Prophetstown, Illinois, June 9.

10. G. GRASILINELLUS Walsh. One male near Prophetstown, Illinois, June 9.

11. DROMOGOMPHUS SPOILIATUS Hagen. A female near Clinton, Oklahoma, August 19.

12. OCTOGOMPHUS SPECULARIS Hagen. A male where Pohono Trail crosses Meadowbrook, June 30. 6000 ft.

13. ANAX JUNIUS Drury. Observed frequently through the west. Six specimens taken in the valley at the foot of El Capitan, Y. N. P., 6000 ft.

14. A. WALSINGHAMI McLachlan. A male swept from the air above a stream near Washington, Utah on August 8. A new record for Utah.

15. AESCHNA CALIFORNICA Calvert. 4 males taken near

Franklin, Idaho on June 15; a female near Great Salt Lake, Utah, June 16.

16. A. MULTICOLOR Hagen. Observed and collected this insect frequently in valleys in Y. N. P. that were not higher than 5000 ft. 2 males near Ensenada, Baja California, August 12; a female near Laguna, N. Mexico, August 18.

17. A. WALKERI Kennedy. 4 males taken June 28 in Y. N. P. at 4000, 5000 and 6000 feet.

18. A. PALMATA Hagen. 3 males, along road twenty miles south of Bryce Canyon, Utah, on August 14.

19. A. INTERRUPTA NEVADENSIS Walker. A male, Dog Lake, Y. N. P., 9000 ft., July 22; a male found on snowbank on Shepherd Crest, Y. N. P., 11,000 ft., August 1.

20. A. VERTICALIS Hagen. A male, Dog Lake, Y. N. P., 9000 ft., July 22; a male, on White Mountain, Y. N. P., 11,000 ft., July 23.

CORDULEGASTER DORSALIS Hagen. 5 males, along Acherson Creek, Y. N. P. (5000) on June 28; 5 males on Indian Creek, Y. N. P., 6000 ft., July 17. The insects flew close to the water and explored every indentation of the shoreline. They were flying with A. *walkeri* Kennedy whose presence they constantly disputed.

22. SOMATOCHLORA SEMICIRCULARIS Selys. Numerous in the high mountain bogs and meadows of Y. N. P. at altitudes of 8-11,000 feet.

23. CORDULIA SHURTLEFFI Scudder. Common in Y. N. P. and frequently found flying with S. *semicircularis* Selys, although often at lower altitudes.

24. PERITHEMIS DOMITIA Drury. Common about a small artificial lake near Clinton, Oklahoma, August 19.

25. LIBELLULA LUCTUOSA Burmeister. Numerous about Clinton, Oklahoma, August 19, where it was flying with *Perithemis*.

26. L. SATURATA Uhler. Observed and captured frequently west and south of Utah, though never above 7000 feet.

27. L. PULCHELLA Drury. Common through west, below 7000 feet.

28. L. QUADRIMACULATA Linne. Frequently observed and collected west and south of the Black Hills, South Dakota. In Y. N. P. often taken up to 10,000 feet.

29. L. NODISTICTA Hagen. Common about the western end of Mono Lake, California, on August 1 and 4, 6000 ft., 2 males and 1 female, Wowona Meadows, Y. N. P., 4000 ft., July 17.

30. L. COMPOSITUS Hagen. 3 males and 5 females, south of Great Salt Lake, Utah, about roadside ditches. One male has well-developed nodal spots.

31. PLATHEMIS LYDIA Drury. Observed at lower altitudes across the country. Few were the reed-edged pools unaccompanied by these "white-tails".

32. P. SUBORNATA Hagen. 3 males and 4 females, on the Great Salt Lake Desert, Utah, June 16.

33. SYMPETRUM CORRUPTUM Hagen. Apparently the most widely distributed Anisopteron in the West. It seemed to flourish in any habitat and at any altitude. It was collected along the ocean in Baja California, along the Colorado River in the Grand Canyon, in the midst of the Great Salt Desert of Utah, among the forests of Idaho, and a lifeless specimen was found on the snow of the Conness Glacier in Y. N. P. at an altitude of 12,000 feet. It was taken over standing water and along swift glacier-fed stream, over deserts and around mountain tops. It was first on wing in the morning and the first on wing after a rain.

34. S. ILLOTUM Hagen. A male, Yosemite Valley, 4000 ft., June 28.

35. S. PALLIPES Hagen. 4 males and 1 female, Yosemite Valley, July 1, 13, and August 4.

36. S. DECISUM Hagen. 5 pair, Wells, Nevada, June 16, where they were emerging in countless numbers. Common in swampy meadows in Yosemite Valley late in June.

37. S. SEMICINCTUM Say. A male, Mather, California June 28, and a female in Yosemite Valley, August 4.

38. S. COSTIFERUM Hagen, 3 males and a female taken in a swampy region of the west shore of Mono Lake, California, 6000 ft., August 1, 4.

39. S. DANAE Sulzer. A series of these insects was taken with S. *costiferum* Hagen on the west shore of Mono Lake, California on August 1 and 4.

40. LEUCORRHINIA HUDSONICA Selys. 2 males and 4 females, Y. N. P. during late June and early August.

41. L. INTACTA Hagen. 2 males, Franklin, Idaho, June 15; 4 males, Mather, California, June 28.

42. L. GLACIALIS Hagen. A series of these insects taken on July 11 and 28 in Y. N. P.

43. PACHYDIPLAX LONGIPENNIS Burmesiter. A male, near Ensenada, Baja, California on August 12.

44. MESOTHEMIS SIMPLICICOLLIS Say. 2 females taken south of the Great Salt Lake, Utah on June 16; a female at Glendale, Arizona, August 13.

45. BRECHMORHOGA MENDAX Hagen. 2 males taken along a rocky stream near Washington, Utah on August 14. A new record for Utah.

46. PALTOTHEMIS LINEATIPES Karsch. A male captured along Bright Angel Creek in the Grand Canyon on August 16.

47. PANTALA HYMENEA Say. Observed and collected frequently through the West, often at high altitudes. Secured a specimen at 11,000 feet on the snow of Conness Glacier, July 23.

48. P. FLAVESCENS Fabricius. 2 males, Lebonon, Missouri, August 21.

49. TRAMEA LACERATA Hagen. 1 male, Lebonon, Missouri, August 21.

50. T. ONUSTA Hagen. 3 males, near Ensenada, Baja California on August 12.

ZYGOPTERA.

51. HETAERINA AMERICANA Fabricius. Collected in Mojave Desert, California; Grand Canyon, Arizona; Albuquerque, N. Mex.; and Bryce Canyon, Utah on August 13, 16, 18, and 20.

52. LESTES CONGENER Hagen. Taken in Yosemite Valley, Mono Lake, Laguna, N. Mex., and Bryce Canyon, Utah on July 2, August 1, 18.

53. LESTES FORCIPATUS Rambur. A series secured in Yosemite Valley during July.

54. L. DISJUNCTUS Selys. 2 females at Bryce Canyon, Utah, August 14; common in Kaibab Forest, Arizona, August 15; 1 female at Clinton, Oklahoma, August 19.

55. L. UNCATUS Firby. Common through west. Series secured in Yosemite during July; at Franklin, Idaho, June 15; and at Wells, Nevada, June 16.

56. HYPONEURA LUGENS Hagen. 3 females taken along a stream near Washington, Utah. A new record for Utah.

57. ARGIA AGRIOIDES Calvert. 1 female taken in the Mojave Desert, California, on August 13; 1 male at Washington, Utah, August 14; 2 males near Laguna, N. Mex., August 18.

58. A. APICALIS Say. A pair, Prophetstown, Illinois, June 9; a pair at Weatherford, Oklahoma, August 20.

59. A. MOESTA Hagen. 2 males, Prophetstown, Illinois, June 9; 1 female, Grand Canyon, August 16; 5 males and 1 female, Clarence, Oklahoma, August 20.

60. A. SEDULA Hagen. 1 female, Clarence, Oklahoma, August 20; 5 males Lebonon, Missouri, August 21.

61. A. VIVIDA Hagen. Common in Yosemite up to 6000 feet during July; 2 males near Great Salt Lake, Utah, June 16; 5 males and 4 females, Grand Canyon, Arizona, August 16.

62. AMPHIAGRION ABBREVIATUM Selys. 2 males and 1 female at Wells, Nevada, June 16; a series at Yosemite during July; 3 males at Bryce Canyon, Utah. August 14.

63. TELEBASIS SALVA Hagen. Very common near Ensenada Baja California, August 12.

64. ENALLAGMA BOREALE Selys. Series at Franklin, Idaho, June 15; 4 males and 1 female, Bryce Canyon Utah, August 14.

65. E. CLAUSUM Morse. Common along roadside through Great Salt Desert, Utah, June 16.

66. E. CYATHIGERUM Charpentier. Series in Y. N. P. during July; a male near Laguna, N. Mex., August 18.

67. E. EXSULANS Hagen. 2 pairs taken near Prophetstown, Illinois on June 9.

68. E. CARUNCULATUM Morse. Specimens taken frequently through western United States and Baja California.

69. E. CIVILE Hagen. Common through west.

70. E. PRAEPARVUM Hagen. 4 males at Albuquerque, N. Mex., August 18; 4 males at Laguna, N. Mex., August 18.

71. E. ANNA Williamson. Series taken just south of Great Salt Lake, Utah, June 16; 1 male at Bryce Canyon, Utah, August 14.

72. ISCHNURA DENTICOLLIS Burmeister. Very common through western United States and Baja California.

73. I. DEMORSA Hagen. 1 male and 2 females at Bryce Canyon, Utah, August 14; 1 male and 2 females at Laguna, N. Mex., August 18. A new record for Utah.

74. I. PERPARVA Selys. Common through west.

75. I. CERVULA Selys. Common through western United States and Baja California.

76. I. DAMULA Calvert. 1 female, Bryce Canyon, Utah, August 14; 6 females, Laguna, N. Mex., August 18. A new record for Utah.

Two New Species of Helmidae from a Warm Spring in Montana. (Coleoptera).

By MELVILLE H. HATCH, University of Washington, Seattle, Washington.

Recently, Dr. C. J. D. Brown of the Department of Zoology, Montana State College sent me a vial containing two new species of helmid beetles which are described below. The beetles were collected by Dr. Brown on December 6, 1936 in a spring with a temperature of about 22° C. throughout the year, located at the mouth of Bridger Canyon, near Bozeman, Gallatin County, MONTANA.

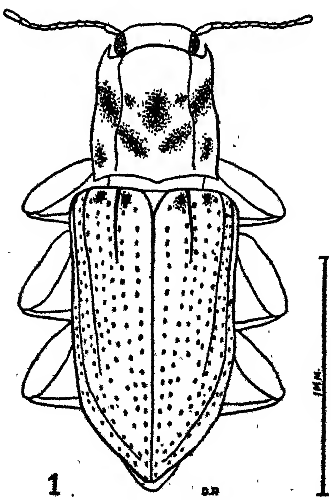
Heterelmis browni n. sp. (figure 1)

Length 2 mm.; piceous, the antennae, elytra, tibiae and tarsi paler; pronotum quadrate, about five-sixths as broad as long, sides bisinuate, anterior angles prominent and acute, posterior

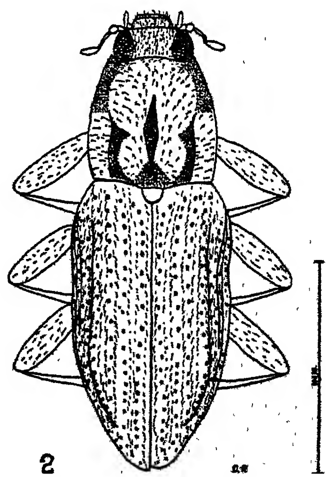
angles slightly acute; disc of pronotum uniformly alutaceous, set with fine hairs, with an elevated, slightly sinuate carina extending from base to apex on either side at a distance from either lateral margin of about one-fifth the total width of the pronotum; the surface of the pronotum undulating with an especially prominent longitudinally oval impression on the middle line just in front of the middle and other less prominent impressions at about the anterior third along the lateral margins and at about basal third just within the lateral carinae and elsewhere; elytra uniformly smooth, shining, set with fine hairs and with about ten longitudinal series of punctures the outer two of which are invisible in dorsal view, the second interval carinate in basal fourth, the fifth interval carinate in about basal three fifths, the seventh interval strongly carinate nearly to apex.

Type and fourteen paratypes in collection of author.

Distinguished from the other nearctic species of *Heterelmis* by the sculpture of the pronotum, which is neither smooth as in *nitidula* LeC. and *latiuscula* LeC. or marked by a transverse impression between the lateral carinae as in *glabra* Horn and *vulnerata* LeC. Morever, the pronotum is said to be broader than long in *glabra* and scarcely longer than broad in *vulnerata*.



1



2

Fig. 1. *Heterelmis browni* n. sp. Fig. 2. *Macronychus thermae* n. sp.

Macronychus thermae n. sp. (figure 2)

Length 2 mm.; piceous, the antennae, legs, elytra, and apical portions of the abdomen paler; antennae short, eight-segmented, the funicle composed of a basal long and four very short segments, the last segment of the antenna forming a well marked club; pronotum widest at about basal fourth where it is nearly as wide as long, apex about seven eighths as wide as the base, the sides somewhat arcuate; anterior angles of pronotum slightly prominent and acute, the posterior angles nearly rectangular; pronotal disc smooth, shining, sparsely coarsely punctate and pubescent, with an opaque longitudinal median impression occupying about or somewhat more than its median half, the region of the anterior angles opaque; the lateral carinae of the pronotum distinct, sinuate, occupying basal three fifths of pronotum, bordering an opaque impressed area on their median side; the median basal portion of the pronotum impressed, this impression more or less confluent with the median and lateral opaque impressions; elytra with about nine longitudinal series of punctures, coarse at base, finer behind the middle, nearly obsolete towards apex; elytral intervals each set with a series of semierect setae, the fourth, sixth, and seventh intervals carinate, carinae crenulate on top, the fourth interval carinate from about basal sixth to beyond apical fourth, the sixth interval carinate to beyond middle, the seventh interval carinate to beyond apical fourth, the carinae of the sixth and seventh intervals confluent for about basal seventh; the surface of the elytra latarad to the fourth interval sericeous except for a smooth humeral space; apex of elytra serrulate.

Type and fourteen paratypes in collection of author.

This species may be distinguished from the other described nearctic species of *Macronychus* by means of the following table.

Key to Nearctic Species of *Macronychus* Müll.

A. Elytra with fourth, sixth, and seventh intervals carinate, the sixth more briefly so, the carinae crenulate on top; pronotum with a median longitudinal impression.

B. Lateral carinae of pronotum nearly entire; elytra without lateral sericeous space; length 2.5 mm.; Calif........ *parvulus* Horn*

BB. Lateral carinae of pronotum confined to basal three fifths; elytra sericeous laterad to the fourth interval; antennae eight-segmented; length 2 mm.; Mont........... *thermae* n. sp

*Taken from description by Horn, Trans. Am. Ent. Soc. III, 1870, p. 41.

AA. Elytra with the seventh interval alone carinate, and it very prominently so, the carina crenulate on top; elytra strongly sericeous laterad to the seventh interval; pronotum without median impression, the lateral carinae vague and confined to the basal half; antennae seven-segmented; length 3-3.5 mm.; Quebec (*Chagnon*), Connecticut (*Britton*), and District of Columbia (*Ulke*) to Michigan (*Hatch*) and Iowa (*Wickham*) .. .. *glabratus* Say

The figures were drawn by Miss Dorotha Pemberton, a student at the University of Washington employed by the National Youth Administration with funds appropriated by the United States Government.

Four New Coleoptera (Elateridae and Buprestidae).

By JOSEF N. KNULL,

The Ohio State University, Columbus, Ohio.

Conoderus browni n. sp.

♂—Form robust, rufocastaneous on both surfaces with a somewhat indistinct irregular dark transverse area at base and another on apical third of elytra, apical one extending along suture.

Head convex; front broadly rounded; surface densely punctured; punctures separated by less than their own diameters; antennae extending one joint beyond hind angles of pronotum, scape stout, second joint slightly longer than wide, third joint longer than second, fourth joint longer than second and third taken together, fifth joint shorter than fourth, joints five to eleven of about equal length, joints four to ten slightly serrate.

Pronotum longer than wide, wider at base than in front, widest back of middle, hind angles produced, acute; disk convex, prehumeral carinae single, sinuate, divergent from lateral margin; surface densely punctured with one type of puncture which becomes smaller at base and sides. Scutellum round, finely punctured.

Elytra a little over two times as long as wide, gradually narrowing posteriorly to rounded apices; disk with strongly impressed striae, punctures small and confluent, interspaces convex, very finely puctured.

Beneath finely densely punctured. Fourth tarsal segment broadly lamellate beneath.

Length 7.6 mm.; width 2.1 mm.

Described from a series of specimens collected at Brownsville, TEXAS, from May 10 to June 6, 1935 by the author.

Holotype male, May 22, and *paratypes* in writer's collection, *paratypes* in Canadian National Collection, U. S. National Museum and Ohio State University Collection.

According to Van Dyke's key[1] this species would run to *C. varians* Seinh., but can be distinguished by the coarser punctures of the pronotum and the smaller size.

Variation. The indistinct dark color pattern unites the two dark areas of the elytra by extending the entire length of the suture in some specimens. Other specimens show signs of a similar median area on pronotum.

I take pleasure in naming this species after Mr. W. J. Brown who has done extensive work with the Elateridae.

Limonius flavomarginatus n. sp.

♂. Resembling a small specimen of *L. griseus* Beauv. in size, form, color and general appearance. Above dark brown, head, pronotum and elytra with exception of sutures margined with dark yellow, beneath in most part dark brown margined with dark yellow, legs same color as the margins; clothed with moderately long fulvous pubescence.

Head with front slightly concave near front margin; front margin broadly rounded, no indication of an emargination; surface densely punctured, punctures separated by less than their own diameters; eyes small, finely granulate; antennae reaching to just beyond hind angles of pronotum when laid along side margin, second and third joints short, of equal length, joints four to ten longer, serrate, eleventh joint elongate.

Pronotum slightly longer than wide, narrower in front than at base, widest back of middle; sides broadly rounded anteriorly, sinuate near base; disk convex, slightly depressed in front of scutellum, prehumeral carinae single, distinct; surface densely punctate, punctures separated by a distance less than their own diameters. Scutellum round, granulate.

Elytra less than three times as long as wide, gradually narrowed posteriorly to rounded apices; disk with striae impressed, punctures large, separated by about their own diameter, interspaces finely punctured, not rugose.

Beneath finely densely punctured; propleurae with punctures contiguous; prosternal sutures distinctly sulcate in front.

Length 9.7 mm.; width 2.5 mm.

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[1] E. C. Van Dyke, Proc. Cal. Acad. Sci., Vol. 20, No. 9, pp. 291-465, 1932.

♀. Differs from the male by antennae not reaching hind angles of pronotum; length 11.1 mm.

Holotype male and *allotype* collected at Rock Bridge, OHIO, June 14, 1936, by the writer, in the collection of the author.

According to Van Dyke's key[1] this species would run to *L. plebejus* Say. It can be distinguished by the fine punctures of the head and pronotum.

Paratyndaris tucsoni n. sp.

♂. Form robust, cylindrical, piceous with violaceous lustre, a small triangular red spot on lateral margin of each elytron, just in front of middle and another like area opposite it near suture, clothed above and below with recumbent white pubescence.

Head convex, no sign of median depression, eyes small, finely granulate; surface finely punctured, densely pubescent; antennae short, not reaching middle of pronotum when laid along side margin, serrate from the seventh joint.

Pronotum slightly broader than long, widest in middle, wider at base than at apex; sides broadly rounded; lateral margin entire; anterior margin broadly rounded; basal margin slightly sinuate; disk convex, void of median depression; surface densely coarsely punctured at sides, transversely asperate in middle, pubescence concealing punctures at sides, pubescence of central area so short that it appears denuded. Scutellum round, glabrous.

Elytra wider than widest part of pronotum; sides constricted back of humeral angles, subparallel back of middle, then rounded to apices; apices with three teeth along margin and three above; lateral margins serrate from middle; disk convex, umbone prominent; surface irregularly striate, punctures of striae much larger than those of interspaces.

Abdomen beneath finely punctured, the vestiture concealing most of the sculpture, second segment at middle of posterior margin with a small rounded plate extending over the third segment, nearly one half of its width; plate granulate, last abdominal segment terminating in an acute spine. Tarsi slender, claws simple, not toothed, but slightly swollen at bases.

Length 6 mm.; width 2.2 mm.

♀. Differs from the male by the ventral abdominal plate being much smaller.

Described from one pair collected at Tucson, ARIZONA, August 13, 1936, by the author. *Holotype* and *allotype* in writer's collection.

According to the key[2] this species comes next to *P. anomalis* Knull. It can be separated from this species by the arrangement of the red markings of the elytra, which are not united. Superficially it resembles *P. acaciae* Knull, but it can be separated by the serrate seventh antennal joint, lack of a median depression on pronotum and having two red dots on each elytron.

Paratyndaris quadrinotata n. sp.

♂. Form robust, cylindrical, piceous above and below, an irregular red area along side margin of each elytron in front of middle, another like round area opposite this near suture, clothed above and below with recumbent white pubescence.

Head convex, no sign of median depression, eyes small, finely granulate; surface coarsely punctured, densely pubescent; antennae short, not extending to middle of pronotum when laid along side margin, serrate from the sixth joint.

Pronotum wider than long, widest in front of middle, wider at base than at apex; sides constricted in front, then broadly rounded to base; lateral margin entire; anterior margin broadly rounded; basal margin slightly sinuate; disk convex, void of median depression, surface densely coarsely asperate. Scutellum round, glabrous.

Elytra slightly narrower than pronotum; sides constricted back of humeral angles, subparallel to back of middle, broadly rounded to apices; apices with three teeth along margin and three above; lateral margins serrate from middle; disk convex, umbone prominent; surface irregularly strigate, punctures of striae much larger than those of interspaces.

Abdomen beneath finely punctured, vestiture concealing most of the sculpture, second segment at middle of posterior margin with a small rounded plate extending over the third segment one-third of its width, plate granulate, last abdominal segment terminating in an obtuse spine. Tarsi slender, claws simple, not toothed, but slightly swollen at bases.

Length: 5.9 mm.; width 2.2 mm.

♀ differs from the male by the ventral abdominal plate being slightly swollen.

Described from a small series collected at Tucson, ARIZONA, from July 27 to August 15, 1936, by the writer. *Type* labeled August 15, *allotype* and *paratypes* in author's collection.

According to the key[2] this species would come next to *P. coursetiae* Fishr. The extra spot on the elytron will serve to distinguish it.

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[2] J. N. Knull, Ann. Ent. Soc. Am., Vol. 30, No. 2, pp. 252-257, 1937.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or last year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the later within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Bodenheimer, F. S.—Population problems of social insects. [Biol. Revs., Cambridge] 12:393-430, ill. **Borgmeier, T.**—Insectos atacando chocolate no Rio de Janeiro. [107] 7:530. **Claassen, P. W.**—Obituary by E. F. Phillips. [12] 30: 807-808, ill. **Gazulla, P.**—Colectores de insectos. [44] 40: 13-19. **Metcalf, Z. P.**—Methods of preserving and studying genitalia. [12] 30: 805. **Porter, C. E.**—Galeria de Naturalistas de Chile. XLV.—El R. P. Felix Jaffuel. [44] 40: 154-159, ill. Galeria de Naturalistas de Chile. XLVI.—El Prof. Carlos Silva F. [44] 40: 203-206, ill. Notas breves de entomologia agricola. [44] 40: 426-429, ill. **Smith & Kelley.**—The sixth annual insect population summary of Kansas covering the year 1936. [103] 10: 113-132, ill. **Weiss, H. B.**—The Vermin Killer: 1775 model. [6] 45: 403-407. **Wheeler, G.**—An entomological dictatorship. [21] 49: 123-124. **Zalessky, G.**—Ancestors of some groups of the present day insects. [31] 140: 847-848, ill.

ANATOMY, PHYSIOLOGY, ETC.—Bhalia & Keilin.—On a new case of parasitism of a snail (Vertigo ugenessi) by a Dipterous larvae. [116] 29: 399-407, ill. **Borquin, F.**—Metamorfosis de Stenoptilia insperata (Lep. Pterophoridae). [107] 7: 426-428, ill. (S). **Campbell, R. E.**—Temperature & moisture preferences of wireworms. [84] 18: 479-489, ill. **Claus, A.**—Einige physiologique über Sigara lugubris (Hemiptera). [34] 120; no. 3/4: 40-44. **Cousin.**

G.—Les arrets du developpement chez Lucillia ampullacea et remarques sur la diapause (Dipt: Muscidae). [25] 42: 218-221. **Dallas, E. D.**—Apuntes sobre teratologia entomologica. [44] 40: 340-342, ill. **Ford, E. B.**—Problems of heredity in the Lepidoptera. [Biol. Revs., Cambridge] 12: 461-503. **George-Grieve, E.**—Studies on the biology of the damselfly, Ischnura verticalis, with notes on certain parasites. [70] 17: 121-153, ill. The muscles of the head stomodeum of an Odonate nymph, Ischnura verticalis. [4] 69: 211-218, ill. **Goldschmidt, R.**—Spontaneous chromatin rearrangements in Drosophila. [31] 140: 767. **Kassianoff, L.**—Etude morphologique et biologique de la famille des Cimicides. [54] 15: 193-217, ill. **Lindquist, A. W.**—Myiasis in wild animals in southwestern Texas. [12] 30: 735-740, ill. **Sharif, M.**—On the internal anatomy of the larva of the rat-flea Nosopsyllus fasciatus. [Phil. Trans. R. Soc. London] B, 227: 465-538, ill. **Snodgrass, R. E.**—The male genitalia of Orthopteroid insects. [Smithson. Misc. Coll.] 96, no. 5: 1-107, ill. **deVailly, J.**—Des causes de la conformation et de la constitution des ailes des papillons, Rhopaloceres en particulier. [Amateur Papillons] 8: 268-275.

ARACHNIDA AND MYRIOPODA—**Canals, J.**—Observaciones biologicas en Aracnidos del orden Opiliones. [44] 40: 61-63. **Fox, I.**—The Nearctic spiders of the family Heteropodidae. [91] 27: 461-474, ill. (*). **Jacot, A. P.**—Journal of North-American Mossmites. [6] 45: 353-375, ill. (*). **Kaston, B. J.**—The black widow spider in New England. [Bull. N. Engl. Mus. Nat. Hist.] no. 85: 3-11, ill. **Kurata, T. B.**—The spiders of Mer Bleue near Ottawa. [Can. Field Nat.] 51: 114-115. **de Mello-Leitao, C.**—Etude sur les Arachnides de Papudo et Constitucion (Chili), recueillis par le Prof. Dr. Carlos E. Porter. [44] 40: 112-129, ill. (k*). **Schulze, P.**—Anocentor columbianus, n. gen., n. sp. (Ixod.). [34] 120: 24-27, ill.

THE SMALLER ORDERS OF INSECTS—**Brown, J. M.**—On some Collembola from Iceland & Greenland. [75] 20: 514-520. **Hood, J. D.**—Studies in Neotropical Thysanoptera. V. [107] 7: 486-530, ill. (*). **Ide, F. P.**—Descriptions of eastern N. A. spp. of Baetine Mayflies with particular reference to the nymphal stages. [4] 69:219-231, ill. (*). **Montgomery, B. E.**—Records of Indiana dragonflies, IX, 1935-1936. [Proc. Ind. Acad. Sci.] 46: 203-210. **Navas, L.**—Insectos Neuropteros de Chile poco conocidos. [44]

40: 179-181, ill. **Thompson, G. B.**—The Esthiopterinae (Mallophaga) parasitic on Pelecaniformes. [75] 20: 539-543, ill.

ORTHOPTERA — **Cousin, G.** — Elevage et biologie de quelques Gryllides. [Rev. Ent., Franc.] 4: 157-162, ill. **Dearolf, K.**—The dwellers in the dark. [Frontiers, Phila.] 2: 44-46, ill. **Hincks, W. D.**—On polymorphism in male Diplatys Macrocephalus (Dermaptera: Pygidicranidae). [8] 73: 247-250. ill. **Snodgrass, R. E.**—see under Anatomy.

HEMIPTERA—**Ball, E. D.**—Some new N. A. Membracidae. [91] 27: 479-482. **Drake & Harris.**—Notes on some American Halobatinae (Gerridae). [105] 7: 357-362, ill. (S*). **Ferris, G. F.**—On nomenclatorial and other problems in the systematics of the Coccoidea. [75] 20: 525-530. **Hambleton, E. J.**—A proposito de um artigo do Dr. Monte sobre Tingitidae. [107] 7: 532-533, (S). **Oman, P. W.**—The Cinerosus Group of the gen. Laevicephalus (Cicadellidae). [91] 27: 474-479, ill ., (*). **Sim, R. J.**—New Jersey lace bug notes. [6] 45: 4081.

LEPIDOPTERA — **Bryk & Eisner.** — A Reply to the Critical Review of the Treatment of the American Species of Parnassius in the "Tierreich" by J. McDunnough in the Canadian Entomologist. [Parnassiana] 5: 3-7, (*). **Davis & Dorst.**—Noctuidae collected by light trap in central Utah. [Proc. Utah Acad. Sci. A. & L.] 14: 179-194. **Ford, E. B.**—see under Anatomy. **Gerasimov, A. M.**—Beitrag zur Psychiden auf Grund der erforschung des Raupen [34] 120: 7-17, ill. **Grimshawe,** F. M.—The Black Witch [Erebus odora (Noct.)]. [Nat. Mag.] 30: 337-338, ill. **Hayward, K. K.**—List of the Argentine spp. of Pholisora (Hesperiidae), with descriptions of two n. spp. [44] 40: 274-278, ill. **Klots, A. B.**—Some notes on Colias and Brenthis (Pieridae & Nymphalidae). [6] 45: 311-333, (*). **Knowlton & Allen.**—Notes on some Utah Lepidoptera. [Proc. Utah Acad. Sci. A. & L.] 14: 155-158. **May, E.**—Lepidoptera from Ceara, Brazil. [44] 40: 111. **Meyrick, E.**—Exotic Microlepidoptera. 5. pt. 5, pp. 129-160, (*). **Richards, A. G.**—Notes on some tropical Noctuids in N. A. [4] 69: 218-219. **Silva, F. S.**—La polilla de palto (Arctopoda maculosa). [44] 40: 220-223, ill. **Sim, R. J.**—Note on giant swallowtail butterfly in New Jersey. [6] 45: 402. **Ureta R., E.**—Lepidopteros de Chile. [44] 40: 343-380. ill. (*). **Ureta**

R., R.—Segunda nota adicional a la lista de Ropaloceros de la provincia de Coquimbo. [44] 40: 108-110.

DIPTERA—Alexander, C. P.—Undescribed spp. of Brachypremna & Tanypremna (Tipulidae), [44] 40: 298-305. ill. (Sk*). **Bequaert, J.**—Triceratomyia, a new South American gen. of Pangoniinae (Tabanidae). [105] 7: 350-353, ill. **Borgmeier, T.**—A descoberta da biologia de Stylogaster (Conopidae). [107] 7: 533, (S). **Bromley, S. W.**—The gen. Stenopogon in the U. S. of A. (Asilidae). [6] 45: 291-309, ill. (k*). New & little known Diptera, with notes on the taxonomy of the Diptera. [Proc. Utah Acad. Sci. A. & L.] 14: 99-109, ill. (k*). **Curran, C. H.**—The generic status of Lagarus Philippi (Stratiomyiidae). [44] 40: 281-282. Three new neotropical Diptera. [44] 40: 331-335. **Czerny, L.**—Erganzungen zu meiner Mono graphie der Helomyziden. [56] 16: 137-142. **Edwards, F. W.**—Bombyliidae from Chile & western Argentine. [44] 40: 31-41, ill. (*). **Epure, E.**—Observations sur le corps gras des larves de Simulium (Diptera). [Arch. Zool. Exp. Gen.] 79: 17-23, ill. **Fisher, E.**—New N. A. Fungus Gnats (Mycetophilidae). [6] 45: 387-401, ill. (k). **Fraga, G., A.**—El genero Dasyapha de la subfamilia Silviinae (Tabanidae). [44] 40: 246-251, ill. (k). **Gonzalez, R. R.**—Acerca de los progresos en el estudio de la Dermatobia cyaniventris. [44] 40: 54-56. **Hardy. D. E.**—New Bibionidae from Nearctic America. [Proc. Utah Acad. Sci. A. & L.] 14: 193-213, ill. **Hennig, W.**—Beitrage zur Systematik der Richardiiden. [107] 7: 484-485 (S*). **Horsfall, W. R.**—Mosquitoes of southeastern Arkansas. [12] 30: 743-748. **Knowlton & Harmston.**—Utah Diptera. [Proc. Utah Acad. Sci. A. & L.] 14: 141-149. **Rempel, J. G.**—A n. sp. of Anatopynia from Colombia (Chironomidae). [105] 7: 413-416, ill. **Ronna, A.**—Novos dados sobre os habitos de Melaloncha ronnai (Phoridae), endoparasita de Apis mellifica. [105] 7: 409-413. **Stuardo, O. C.**—Nemestrinidos nuevos Chilenos y anotaciones sobre dos especies conocidas. [44] 40: 169-178, ill.

COLEOPTERA—Bierig, A.—Algunos nuevos Estafilinidos cubanos [115] 11: 273-283, ill. (*). **Bleasdell, G. G.**—The Rhynchophora of Iowa. [Iowa St. Coll. Journ. Sci.] 11: 405-445. **Bondar. G.**—Notas entomologicas de Bahia (1). [107] 7: 475-483, ill. (S*). **Bosq, J. M.**—Copula de los Scarabaeidae de distintos generos. [44] 40: 26-28, ill. **Bruch, C.**—Metamorfosos y etologia de dos Hispidos. [Rev.

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A New Butterfly Record for the United States *

A battered female specimen of one of the blue colored Anaeas was taken by H. Glazbrook on July 30, 1935, at the Kenedy Ranch, Kenedy County, Texas, and sent to the writer for determination. It turned out to be *Anaea phithyusa* Felder. The battered condition of this specimen indicates that it had probably traveled a great distance. It is very unlikely that this Southern Mexican and Central American species will become established within the borders of the United States.

The writer believes that butterfly visitors should be placed on our check lists provided the fact that they are only known as visitors is clearly indicated.

This specimen is in the collection of H. Glazbrook of Sarita, Texas.

WILLIAM D. FIELD, Colorado Springs, Colorado.

The one hundred and fiftieth anniversary of the birth of THOMAS SAY was observed by the Academy of Natural Sciences of Philadelphia on July 27, 1937, when S. Davis Wilson, mayor of Philadelphia, made the commemorative address. *Science*, July 30, 1937, p. 97.

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* Contribution from the Penrose Museum of Rhopalocera, Colorado Springs, Colorado.

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A Method of Rearing Hexagenia Nymphs (Ephemerida).

By HERMAN T. SPIETH.
The College of the City of New York.

No one has ever succeeded in rearing mayflies of the genera *Hexagenia, Ephemera,* or their relatives through an entire life cycle. Wiebe, 1926, has described the first three larval stages of *Hexagenia bilineata* Say. In view of later taxonomic work that has been done on *Hexagenia,* it seems probable that this is a misidentification and that Wiebe was dealing with *Hexagenia occulta* Walker. Neave, in 1932, incubated the eggs of *Hexagenia occulta* and then from a statistical study of nymphs collected from Lake Winnipeg decided that the complete life history, with limited exceptions, took two years. Ide, 1935, reared the first 11, the 13th, and the last 8 instars of *Ephemera simulans* Walker, but missed the intervening stages. Many other workers have hazarded guesses as to the length of the life cycles of these burrowing forms, but they have not had sufficient evidence to establish their statements.

There seems to be fairly general agreement on the following points: (1) that the eggs of the burrowing species can be obtained by stripping and can be readily incubated; (2) that the later stages, up to and including the emergence of the subimago, can be successfully handled under experimental conditions; (3) that the rate of incubation of the egg, the development of the nymph, and consequently the length of the life cycle are dependent mainly upon the external temperature. Thus the main difficulty seems to be that no one has devised a suitable method of handling the nymphs during the younger and intermediate stages, at the same time keeping them in a habitat similar to their normal environment. The methods recorded in the following pages seem to offer a solution to this difficulty.

At Lake Wawasee, Indiana, *Hexagenia occulta* usually emerges in great numbers at various times during the month of July. These swarms appeared in 1927 on July 3, 6, 13, 18, and 27th. Scattered specimens were collected during the last week of June and the first week of August. The subimagoes appear in the early evening, at which time they are positively phototropic and collect in great numbers around electric lights along the shore. The next day they can be found on the under sides of leaves, in tall grass, cat tails, and other forms of vegetation. Often they are located several hundred yards from the shore of the lake.

During the afternoon, the subimaginal skin is cast. Just at dusk the imagoes appear for the nuptial flight. The males first collect in groups, usually near the shore, and engage in the nuptial dance. By the time the majority of the females have joined them, it is almost dark and they are all concentrated near the shore. After mating in the air, the females fly out over the lake and drop two cylindrical packets of eggs.

On July 3, 1927, specimens in copula were collected from a swarm and the females stripped of their eggs. The packets of eggs were dropped into quart jars which were about half full of water. Upon touching the water, the egg packets immediately dissolved and the individual eggs fell to the bottom. The eggs apparently are coated with a sticky substance that hardens in a short time, for after a few minutes they can be removed only by force. Four such cultures were collected. Two of the jars were partially immersed in a small stream, in a completely shaded location. The others were kept in the building that served as a laboratory, where the temperature was much higher. In the latter cultures, the nymphs emerged after 15 days and in the former they emerged after 20 days.

The newly hatched nymphs were observed to be negatively phototropic, and since they belonged to a species whose nymphs burrow they were assumed to be positively thigmotropic. Several cake pans 4" x 4" x 8" were procured and filled about half full of mud from the bottom of a small stream. This mud was similar to that of the lake shore, but was taken from

a locality where no females had been observed to oviposit, nor had any individuals been seen mating in this vicinity. The mud was carefully gone over to remove any large organisms, especially predaceous ones. Two days after the nymphs emerged, they were placed in the pans and kept in a cool place for 12 hours. At the end of this period the pans were immersed in a gently flowing stream. Thus the nymphs were in a habitat similar to their normal one, and yet in order to escape they must leave the mud and swim over the edge of the pan. This they did not do.

From time to time, the pans were taken from the water and a sample of the mud removed. This was put into a white enamelled pan with a small amount of water and carefully searched for nymphs. Because of the small size of the nymphs, this was difficult at first, but within a few weeks they had reached such a size as to be easily located (see chart).

At the end of August a large washtub was partially filled with mud and all of the cultures added to it. The tub was then placed in an unused pond of the State Fish Hatchery at Lake Wawasee. This pond was supplied with fresh water by a natural spring and an inlet from a lake. On returning to Lake Wawasee on October 15, 1927, it was found that there were a great many nymphs in the tub. They had grown enormously during the intervening period (see chart). It was impossible to see the culture again until June of 1928. At that time there were no nymphs in the tub. Whether they had emerged, migrated, died, or had been killed by predators, it is impossible to say.

The average length of the newly hatched individuals was approximately 0.9 mm., whereas full grown nymphs vary from 18 to 27 mm. for males, and from 20 to 30 mm. for females. An inspection of the table shows that the specimens in the cultures grew rapidly, but that within a group of the same age a great amount of disparity in size was soon observable. Furthermore, within three months some of the individuals were half grown. It seems difficult to conceive that these specimens would not have ordinarily emerged the following summer. In

point of fact, there seems to be no reason why a species in the northern part of its range might not take two years to mature, while in the southern part of its range one year would be sufficient.

The following table gives a fair picture of the rate of growth of the specimens in the cultures. Unfortunately the number of specimens collected was not large.

Age-days from hatching to preserving	Number Speci-mens	Average Length	Minimum Length	Maximum Length
10	3	1.5	1.5	1.5
14	2	1.75	1.5	2.0
16	11	2.61	2.25	3.0
21	2	2.8	2.25	3.75
26	1	3.75	3.75	3.75
28	3	3.2	2.5	4.0
30	2	3.5	3.0	4.0
33	7	4.8	4.5	5.5
88	16	11.3	7.5	16.0

Summary.

(1) A method has been presented for rearing the nymphs of burrowing mayflies. The method seems entirely feasible provided the investigator has facilities where he can watch his cultures over a period of time.

(2) In view of the fact that the rate of development is mainly dependent upon temperature, there seems to be no reason why the length of the life cycle should not vary in different parts of the range within which the group is found.

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Where and When to find the Orthoptera of Pennsylvania, With Notes on the Species Which In Distribution Reach Nearest This State.

By MORGAN HEBARD, Philadelphia, Pennsylvania.

(Continued from Vol. XLVIII, Page 280)

TETTIGONIIDAE.

PHANEROPTERINAE.

SCUDDERIA SEPTENTRIONALIS (Serville). Present through the mountains and probably in the more boreal spots locally in the lowlands of Pennsylvania. A southeastern limit is Town Bank, New Jersey. Sylvan, living in trees and bushes. One of the least often seen Katydids. Probably most active at night if not strictly nocturnal, as is the case with most species of this subfamily. Females are very rare in collections. Appears adult in mid-July.

S. PISTILLATA Brunner. A boreal bush-dwelling species, preferring bushes in pastures or open areas in northern swamps and forests. Peculiar to the mountains of Pennsylvania and there quite generally distributed but usually in small numbers. Appears adult in early August.

S. CURVICAUDA CURVICAUDA (DeGeer). Probably present throughout Pennsylvania in dry fields and woodlands where it is often found low in oak trees or on oak sprouts[8]. Appears adult in early July.

S. TEXENSIS Saussure and Pictet. Present throughout Pennsylvania through local and scarce in the more boreal mountainous sections. Prefers tall weeds and grasses in moist or wet spots, swamps and marshes, where it is often abundant. Appears adult in early July.

S. FURCATA FURCATA Brunner. The most generally distributed and common species of the genus throughout Pennsylvania. Found in tall herbage and in bushes and trees of both dry and wet areas. Appears adult in early August.

S. FASCIATA Beutenmüller. Long considered a mere color phase of *furcata,* I am now satisfied that *fasciata* represents

[8] This insect is often confused with *texensis* and the majority of records from marshes are probably based on material of that species.

a valid species. Present probably throughout northern Pennsylvania and in boreal spots in the southeastern section. Local and little known. I have material from Chestnut Hill and North Mountain. Prefers hemlock and other northern conifers. Appears adult in August.

AMBLYCORYPHA OBLONGIFOLIA (DeGeer). Found throughout Pennsylvania but probably scarce in the more boreal northern and mountainous portions of the State. Often numerous in rank weeds and vines particularly in moist areas at the forest edges. Appears adult in July.

A. FLORIDANA CARINATA Rehn and Hebard. Much like *oblongifolia* in choice of habitat but not a race as was originally explained[9]. Known only from along the Delaware River in southeastern Pennsylvania. Appears adult in mid-July.

A. ROTUNDIFOLIA Scudder. Confined to the mountains and northern portions of Pennsylvania where it is probably often quite numerous. Prefers undergrowth particularly of open deciduous woodlands. Appears adult early in July.

Although *A. uhleri* Stål is scarce in the Pine Barrens of New Jersey north to Whitings, it has been reported east to Cinnaminson (VIII, 13, 1920, (Brindley), 1 ♂ (given as "Riverton" by Fox); Woodbury, VIII, 4, 1921, (H. Fox), 1 ♂, and Lucaston, IX, 7, 1908, 1 ♂, recorded by Rehn and Hebard. Thus it may well occur in the undergrowth on the banks of the Delaware in southeastern Pennsylvania. It appears adult in July.

MICROCENTRUM RHOMBIFOLIUM (Saussure). Probably limited to the lowlands of southeastern and southwestern Pennsylvania. A northern record is Brownsburg and I have material from Kutztown and Harrisburg. Aboreal, sometimes present in bushes or in forest undergrowth. Appears adult in late July.

PSEUDOPHYLLINAE.

PTEROPHYLLA CAMELLIFOLIA (Fabricius). Present throughout Pennsylvania except in the most boreal areas in the northern mountains. In some sections decidedly local. Lives in decidu-

[9] Though so assigned by Blatchley in 1920.

ous treetops and is never seen near the ground until after Fall storms or when females are ovipositing in the bark of trees. Though large colonies are often heard and the mountain forests are full of these, individuals are extremely difficult to capture unless a colony can be located in an area of low trees. They are then best secured with the aid of an electric torch and a long pole, or by shaking saplings vigorously, as they fall to the ground and can not fly. The song is much the loudest of any katydid of this region. Adults appear late in July.

COPIPHORINAE.

NEOCONOCEPHALUS RETUSUS (Scudder). Confined to the lowlands of eastern (and probably southwestern) Pennsylvania but there moderately numerous and sometimes very abundant. Widely distributed in open grassland. Is sometimes to be heard singing on sunny afternoons late in the Fall but is normally much more active at night. Appears adult in mid-August.

N. PALUSTRIS (Blatchley). Known only from the swamps along the Delaware River in southeastern Pennsylvania. Prefers grasses growing within such swamps and much less often found in marshes. Very local and not frequently located but sometimes the colonies are very large. Northern limits are New Brunswick and Trenton, New Jersey and Cornwells, Pennsylvania. Appears adult in early August.

As *N. caudellianus* Davis has been taken at Palmyra and Cinnaminson (Riverton)) by Fox it will undoubtedly be found on the opposite side of the Delaware River in Pennsylvania. Prefers denser clumps of weeds and grasses in open. Usually scarce and elusive. Appears adult in mid-July.

N. ROBUSTUS CREPITANS (Scudder) intergrading with *robustus robustus* (Scudder). Present in southeastern Pennsylvania only, in the marshes along the Delaware River north to Trenton, New Jersey. In high marsh vegetation and also in nearby upland grasses. Local and moderately numerous. Appears adult in mid-July.

N. ENSIGER (Harris). Present in the boreal and mountain areas and probably all of eastern Pennsylvania, with Philadelphia and Paxtang southeastern limits. Widely distributed

in open. Prefers dry upland pastures and cultivated fields. Reaches maturity in early July.

Since *N. lyristes* (Rehn and Hebard) is widespread in the salt marshes of the Atlantic Coast and also occurs in the bogs of Ohio, it should be sought in the bogs and marshes of southern Pennsylvania. In favorable environment the species is often locally abundant. Appears adult in mid-July.

N. EXILISCANORUS (Davis). Present in southeastern Pennsylvania locally in high weedy growth bordering marshes. When located a colony is often found to be of large size. Appears adult in late July.

CONOCEPHALINAE.

ORCHELIMUM AGILE (DeGeer). Probably confined to the lowlands of southeastern Pennsylvania. Inhabits the tall vegetation of fresh-water and tidal marshes and bogs. Northern limits are West Creek and Florence, New Jersey, and Cornwells and Collegeville, Pennsylvania. Appears adult in early August.

As *O. glaberrimum* (Burmeister) is known in New Jersey from a number of localities near the Delaware River north as far as Burlington and Talleyville, Delaware (Fox in litt.) it is sure to be found in the bogs and wet meadows along the southeastern margin of Pennsylvania. It appears adult in mid-July.

O. VULGARE Harris. Common throughout Pennsylvania in the open, particularly in tall weeds. Appears adult in mid-July.

O. GLADIATOR Bruner. A boreal species which occurs throughout Pennsylvania but probably is very local in the southern lowlands.. Southern limits are Winslow Junction, New Jersey; between Wilmington and New Castle, Delaware, and I have material from Pittsburgh, Pennsylvania. From this State the only other material before me is from localities in the southeastern portion. It frequents wet grassy areas and bogs and is usually present locally in colonies. It appears adult early in July.

As *O. silvaticum* McNeill[10], a mid-western species, occurs in Ohio east to Tuscarora, Guernsey and Monroe Counties (E. R. Thomas). it will probably be found in the lowlands of extreme southwestern Pennsylvania. In this region it prefers the undergrowth along forest borders and in open woodlands. It appears adult in July.

O. PULCHELLUM Davis[11]. Present only in southeastern Pennsylvania. Local but often very abundant, confined to high swamp and marsh vegetation. Northern limits are Red Bank, South River and Trenton, New Jersey; Cornwells and Chestnut Hill, Pennsylvania. Appears adult early in August.

O. MINOR Bruner. Arboreal and peculiar to pine trees. Known north to Yaphank on Long Island, New York; Helmetta, New Jersey, and White Deer [Hebard Cln.] and Bloomsburg [Davis Cln.], Pennsylvania. Probably has a wide but discontinuous distribution through xeric sandy areas with pines over the southern half of the State. A difficult insect both to locate and to capture. Appears adult early in August.

O. CONCINNUM CONCINNUM Scudder. Present locally in the marshes and marshy meadows of the Delaware Valley in southeastern Pennsylvania north to Morrisville, reaching this area from the sea coast where it is very abundant locally in the salt marshes. May reappear in bogs in southwestern Pennsylvania as it is present in such environment in Ohio. Becomes adult in mid-July.

As *O. concinnum delicatum* Bruner is known east to Ashtabula County, Ohio (E. R. Thomas) along the shore of Lake Erie, its distribution there is probably extended narrowly along the northwestern margin of Pennsylvania. It is a western race of the species, the intrusions of which eastward are surprising. "Only in swales bordering sand dunes" (E. R. Thomas for Ohio, in litt.). Appears adult in mid-July.

The presence of *O. nigripes* Scudder, a mid-western species. in Ashtabula and Columbiana Counties, Ohio (E. R. Thomas),

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[10] The synonymy of *Orchelimum calcaratum* Rehn and Hebard 1915 was established by the author in 1934.

[11] Incorrectly placed as a synonym of *laticauda* Redtenbacher by Rehn and Hebard in 1915.

indicates that it will certainly be found in the lowlands of western Pennsylvania. Usually present in great numbers in vegetation bordering water, it appears adult in late July.

As *O. volantum* McNeill, long supposed to occur only in the upper Mississippi Valley, has been taken on the Delaware River in New Jersey from Delanco to Repaupo, it is certain to be found at least along that river in southeastern Pennsylvania and may have a wide distribution in suitable environment throughout the lowlands of the entire State. Essentially aquatic and fairly frequent on spatterdock, *Nymphea advena,* which grows in water, difficulty of approach probably is the reason for the great gaps in its known distribution. Appears adult in mid-July.

O. SUPERBUM Rehn and Hebard. Present along the margins of the Delaware River and in adjacent wet meadows in southeastern Pennsylvania, material from Boothwyn alone is before me. On the New Jersey side it is known north to Charleston. Inhabits the rank vegetation of wet meadows, bogs and sloughs, appearing adult in late June.

CONOCEPHALUS FASCIATUS FASCIATUS (DeGeer). Present and often locally numerous throughout Pennsylvania, in open in grasses. Appears adult early in July.

C. BREVIPENNIS (Scudder). Present throughout Pennsylvania, moderately abundant and local, in open but preferring a somewhat shaded environment. Appears adult early in August.

C. NEMORALIS (Scudder). Probably present throughout Pennsylvania except in the eastern lowlands. Known east to the Hudson Palisades, New Jersey; Harrisburg, Pennsylvania, and Washington, D. C. Sylvan and very local but when present usually in moderate numbers in woodland grasses. Appears adult in early August.

C. STRICTUS (Scudder). Occurs in southeastern and undoubtedly in western Pennsylvania. Northern limits are Van Cortlandt Park (H. Fox) and Staten Island, New York; Alpine and Oradell, New Jersey, Tullytown and Harrisburg, Pennsylvania, and Ashtabula County, Ohio (E. S. Thomas). In grasses (*Andropogon*) on dry poor soil or sandy areas. Appears adult in early August.

(To be continued)

The Interpretation of the Term Subspecies and the Status of Names applied to Lower Categories in Lepidoptera.

By WILLIAM HOVANITZ, University of California, Berkeley.

A lack of uniformity in the literature of entomology concerning the usage of polynomials and concerning the interpretation of the term[1] *subspecies* promises even greater confusion in the future unless authors can come to an agreement. This is especially true in the taxonomy of Lepidoptera where authors seem to be working each under his own code. There seems to be no excuse for disagreement so long as we abide by existing rules[2] and, therefore, this paper has been written to show how this lack of uniformity is affected by the following two statements derived from the code:

I. No zoological category recognized in the rules is therein defined. That is, *family, subfamily, species, subspecies,* and other categories are not defined.

II. Only two classes of names in the lower categories are recognized: the *binominal* and the *trinominal* applied under the rules of binary nomenclature. (Ref. "Article 2. The scientific designation of animals is uninominal for subgenera and all higher groups, binominal for species, and trinominal for subspecies.").

From these two statements it follows that:

(a.) The subspecies is the only category of lower rank than the species and its name exists only as a trinomial.

(b). Names proposed as polynomials (larger than trinomials) are unavailable under the code. They do not apply under the Law of Priority (Article 25.) until they are reproposed as a *bi-* or *trinomial* name and they date thence from the time of reproposal, not from that of the original appearance.

[1] The reader should note that only the *term* subspecies is referred to; no reference is made nor implied that a biological entity or category is to be interpreted.

[2] The International Rules of Zoological Nomenclature. Reprinted: Proc. Biol. Soc. Wash. 39:75-104, 1926.

(c.) Names proposed as bi- or trinomials are unaffected as to availability by reason of their having been originally described as of a biological category not generally considered of taxonomic[3] significance.

EXAMPLES OF PRACTICAL ASPECTS OF THE PROBLEM.

1. A white female of an American pierid butterfly was described as *Eurymus alexandra edwardsii* form *hatui* B. & B. The name *hatui* is quadrinomial and hence is unavailable.

2. A nymphalid butterfly (*Euphydryas editha* (Bdv.)) was described as having come from the northern part of California. Another population of this species occurs to the south near San Diego and an aberrancy (*E. editha* ab. *fieldi* Gunder, 1924.) was named as of this population. Later, it was found that this population was subspecifically distinct and another name (*E. editha* r. *wrighti* Gunder, 1929.) was applied to it. According to the above principles, we see that the latter name (*wrighti*) must be placed as a synonym of the former (*fieldi*), *fieldi* having become the subspecific name.

3. The name *interligata* Cabeau (described in trinomial form) has been applied to six different species of *Argynnis* as an aberrancy name. Although I could not refer to the original description (Rev. Mens. Soc. Ent. Namur. 1919:49; and 1922: 46), assuming that my information is correct, all these names except the first are homonyms in the genus *Argynnis*. The first, which merely designates an aberrancy, will necessarily have to be placed as a synonym of the earliest named subspecies from which the aberrancy came.

4. Verity (Journ. Linn. Soc. Lond. 32: 149-152, 1913) has found that the name *adippe* Linn. as now used in the genus *Argynnis* for a European butterfly was originally applied to an abnormal form of another species in the same genus (*niobe* Linn.) in the binomial form. The former, therefore, falls as a synonym of the latter. What name is available for the former entity, I could not ascertain from the literature at hand, but I here append a summary which I have drawn from Verity

[3] *Taxonomy* refers to a phylogenetic arrangement of organisms while *nomenclature* refers to the mechanics of the arrangement. The reader should clearly distinguish the two.

(Ent. Rec., London, 42: 149-152, 1930) and which may be of help to some future worker:

Argynnis niobe niobe Linnaeus
Papilio niobe Linn., 1758, Syst. Nat. Ed. 10: 481
Papilio cydippe Linn., 1761, Fauna Suecica 2:
Papilio adippe Linn., 1767, Syst. Nat. Ed. 12:786
Argynnis ....
Papilio phryxa Bergstrasser, ?
Papilio adippe Rottembourg, 1775, Der Naturforscher, ?
Papilio adippe Esper, 1777, ?
Papilio syrinx Borkhausen, 1788, Eur. Schmett. 1:37 ?
Argynnis esperi Verity, 1913, Journ. Linn. Soc. Lond. 32:175
And the names *adippe* and *cydippe* by many authors as well as innumerable other names applied to this category.

5. Though the following example is similar to one above, it is given because of its importance to a bulky work recently published, namely, Warren's "Monograph of the Genus Erebia Dalmon", Brit. Mus., London, 1936. In this work, the first species is *Erebia ligea* Linn.; the second subspecies other than *ligea* is given as *carthusianorum* Fruhst., 1909; under this are many quadrinomials. One of the latter, *subcaeca* Schultz, 1908 (according to Warren originally proposed as *Erebia ligea* ab. *subcaeca* Schultz; a trinomial) is older than *carthusianorum* and must supersede it in usage for the subspecific name. Other names must either yet attain bi- or trinominal standing or become synonyms if available. It is obvious that if *subcaeca* were not used it would have to stand as a synonym of a name younger than itself!

Notes on Hippoboscidae: 11. Additional Notes on Pseudolynchia. (Diptera.)

By J. Bequaert, Department of Tropical Medicine, Harvard University Medical School, Boston, Mass.

I have dealt on two previous occasions (1926 and 1935) with the problem of distinguishing species in the genus *Pseudolynchia*. This is of more than taxonomic importance, first because one of the species is a common ectoparasite of domestic pigeons and secondly because that species is the intermediate host and carrier of an important blood parasite of the pigeon.

In my latest attempt I separated four species in a key, but I recognized that one of them was doubtfully distinct. Much additional material has been seen meanwhile. While most of it fitted readily in my proposed scheme, some proved extremely troublesome. This was particularly the case for a series of four specimens recently received from Mr. G. A. H. Bedford.

There is never any difficulty in separating *P. brunnea* by the characters given in my key. The remaining three species I recognized (*maura, canariensis* and *rufipes*) are often perplexing. A renewed and most careful study has failed to disclose any characters beyond those used in my key (1935). These are all slight and of degree only, consequently difficult to appreciate. Some of the specimens seen bridge over the differences which I pointed out between *maura* and *canariensis,* so that I am forced to the conclusion that these two, at any rate, are not specifically distinct. Unfortunately, this will entail the displacement of the well-known *P. maura* (Bigot) by the older name *P. canariensis* (Macquart). Provisionally I retain *P. rufipes* (Macquart) as distinct, recognizing for the present three species in the genus.

1. PSEUDOLYNCHIA BRUNNEA (Latreille).—I have seen additional specimens from MINNESOTA, off a nighthawk, and from OHIO, off *Antrostomus carolinensis* (Gmelin).

2. PSEUDOLYNCHIA CANARIENSIS (Macquart).—Synonyms: *Olfersia canariensis* Macquart, 1840; *Olfersia garzettae* Rondani, 1879; *Olfersia maura* Bigot, 1885; *Olfersia lividicolor,* Bigot, 1885; *Olfersia capensis* Bigot, 1885; *Olfersia exornata* Speiser, 1900; *Lynchia simillima* Speiser, 1904.

Additional Localities: FRANCE: Ushant (or Ouessant), off *Streptopelia t. turtur* (Linnaeus) (sent by G. A. H. Bedford). —CANARY ISLANDS: Sa. Cruz de Teneriffe, off domestic pigeon.—NORTHERN RHODESIA: Mazabuka, off red-footed kestrel, *Erythropus amurensis* Radde (P. LeRoux). SOUTHERN RHODESIA: Salisbury, off *Clamator* (or *Oxylophus*) *cafer* (Lichtenstein) (A. Cuthbertson); Kezi, off a (wild?) dove (A. Cuthbertson).—TRANSVAAL: Onderstepoort, off domestic pigeon (G. A. H. Bedford).—PHILIPPINE ISLANDS: Sibuyan

Id., off *Streptopelia dussumieri* (Temminck); San Juan del Monte, Rizal Province, Luzon, off pigeon (C. S. Banks); Manila, Luzon, off pigeon (C. S. Banks). All locality and hosts records previously (1926 and 1935) published by me for *P. maura*, *P. lividicolor* and *P. canariensis* should be referred to *P. canariensis*.

The wing length seems to vary much in this species, the extremes measured being 5.5 mm. and 7.5 mm. Specimens from domestic pigeons average longer wings than those from most wild hosts. I have seen specimens which bridge the gap, and one of these, with a wing length of only 6 mm., came from a domestic pigeon in the Transvaal. The variation of the relative length of the hind legs seems to follow the same rule. Neither appears to provide a reliable standard for separating *maura* from *canariensis*. In a series of eight specimens from the Philippines, from pigeon, the wing measures from 5.8 to 6.5 mm.; and it is 5.5 mm. in the fly from the turtle dove in France. Nevertheless it seems remarkable that the wing of flies found on domestic pigeons is usually so much longer. Might it not be that *P. canariensis* is actually in the process of developing a long-winged race, or incipient species, indirectly under the influence of the domestication of one of its original wild hosts?

Since I can no longer regard *maura* as specifically distinct from *canariensis*, I feel no further compunction in relegating to the synonymy of the same species *garzettae, lividicolor, capensis, exornata* and *simillima*. *P. canariensis* is nowadays almost cosmopolitan; yet I believe that its original home was the Old World tropics and subtropics, and that it was introduced into the New World by man with domestic pigeons.

3. PSEUDOLYNCHIA RUFIPES (Macquart).—Additional Locality: TRANSVAAL: Onderstepoort, off *Centropus burchelli* Swainson (G. A. H. Bedford).

This species seems to differ constantly from *P. canariensis* in the slightly wider and more parallel-sided frons, the somewhat longer postvertex (antero-posteriorly), the shape of the fronto-clypeus (with a narrow and long base), the relatively

shorter and broader humeral angles and the narrower scutellum; the wing is always short. I have as yet seen no specimens that would seem to be transitional to *canariensis*. Moreover, it appears to be restricted to Africa, being originally described from the island of Reunion. Although it is found on a variety of birds, it has not yet been taken on wild or domestic pigeons.

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BEQUAERT, J. 1926. Notes on Hippoboscidae. 1. *Lynchia* Weyenbergh and *Lynchia* Speiser are not congeneric. (Psyche, XXXII, 1925, pp. 265-277).

1935. Notes on Hippoboscidae. 9. A further study of *Pseudolynchia*. (Rev. Zool. Bot. Afric. XXVII, pp. 395-399).

Odonata at Winter Park, Florida.

By E. M. DAVIS and J. A. FLUNO, Rollins College, Winter Park.

Following is an annotated list of species collected since October 1934, within 15 miles of Winter Park. The Wekiwa River, referred to below, is 12 miles northwest of Winter Park. Most of the species listed have been checked with specimens at the Museum of Comparative Zoology, Cambridge, Massachusetts, if there seemed to be any question about them.

GOMPHOIDES [PROGOMPHUS] OBSCURA (Rambur). Found always on sandy shores of local lakes, fairly common. Apr. to Aug.

GOMPHOIDES WILLIAMSONI Gloyd. Abundant on the Wekiwa R., locally common in Winter Park. June to Sept. One male has been compared with one of Mrs. Gloyd's paratypes and with her description by Dr. P. P. Calvert, who is responsible for this identification.

HAGENIUS BREVISTYLUS Selys. Scarce. Wekiwa R. Much larger than northern specimens, length av. 84 mm.; f. wing, av. 56 mm. June to Nov.

DROMOGOMPHUS SPINOSUS Selys. Three specimens from Wekiwa R., one from Winter Park. June to Sept.

GOMPHUS CAVILLARIS Needham. Common, Feb. to May. Identification (1 ♂) confirmed by Dr. P. P. Calvert.

G. DILATATUS Rambur. Common on Wekiwa R. Mar. and Apr.

G. MINUTUS Rambur. Common. Feb. to May.

G. PALLIDUS Rambur. Occasionally seen, two specimens collected. April.

G. PLAGIATUS Selys. Scarce. July to Sept.

GOMPHAESCHNA ANTILOPE (Hagen). Scarce. Taken in Jan., Mar., and June.

CORYPHAESCHNA INGENS (Rambur). Abundant. Mar. to Aug.

TRIACANTHAGYNA TRIFIDA (Rambur). Very common in 1934, occasional since. Oct. to Jan.

GYNACANTHA NERVOSA Rambur. Scarce in 1934, common to abundant in autumn since. Aug. to May.

NASIAESCHNA PENTACANTHA (Rambur). Scarce. Apr. to July.

EPIAESCHNA HEROS (Fab.). One specimen collected, Mar. from Wekiwa R. Probably not as rare as this one record would indicate.

ANAX JUNIUS (Drury). Found throughout the year, common in summer.

A. LONGIPES Hagen. Fairly common, Mar. to Sept.

MACROMIA TAENIOLATA Rambur. Taken on Wekiwa R. and in Winter Park. Fairly common, June to Nov.

DIDYMOPS TRANSVERSA (Say). Common in spring. Mar.

EPICORDULIA REGINA Selys. Abundant over lakes and rivers. Mar. to July.

TETRAGONEURIA SEMIAQUEA (Burm.). Uncommon, but found on Wekiwa R. and near water in other places. Jan. and Feb.

T. STELLA Williamson. Rare. Nov. and Mar.

SOMATOCHLORA FILOSA (Hagen). One specimen from Rock Springs, Orange Co. Sept. 1936.

LIBELLULA AURIPENNIS Burmeister. Common. Feb. to Sept. One record for Dec.

L. AXILLENA Westwood. Common some years, not others. There are some specimens which may be a cross between *axillena* and *incesta*.

L. DEPLANATA Rambur. Common in early spring. Jan. to Mar.

L. INCESTA Hagen. Fairly common. June to Sept.

L. JESSEANA Williamson. Abundant in 1935, none seen in 1934 or 1933; none seen in 1936. Males are easily recognized at sight by the deep blue head, thorax, and abdomen, and orange wings. Ordinarily they fly four to six feet in the air over the edges of ponds. April to Sept.

L. VIBRANS Fabricius. Wekiwa R. April to June.

ORTHEMIS FERRUGINEA (Fabricius). Found each year at a small lake at Apopka, and one has been taken at a lake in

Orlando. Males are easily recognized by peculiar red violet color. Oct. and Nov.

CELITHEMIS AMANDA (Hagen). Common. June to Aug.

C. BERTHA Williamson. Abundant. Mar. to Dec.

C. EPONINA (Drury). Abundant. Mar. to Dec.

C. FASCIATA Kirby. Rare. June to Aug.

C. ORNATA (Rambur). Abundant. Mar. to June.

PERITHEMIS SEMINOLE Calvert. Abundant. Apr. to Nov.

ERYTHRODIPLAX MINUSCULA (Rambur). Found all the year, abundant in warm weather.

PACHIDYPLAX LONGIPENNIS (Burmeister). Found all the year, abundant in warm weather.

BRACHYMESIA GRAVIDA (Calvert). Abundant around lakes in Winter Park. Apr. to Nov.

ERYTHEMIS SIMPLICICOLLIS (Say). Abundant around lakes. Mar. to Oct.

TRAMEA CAROLINA (Linn.). Dark area of hind wing varies from the typical as illustrated by Needham[1] to slightly less than the dark area in *T. onusta*. Found all the year, abundant in warm weather.

PANTALA FLAVESCENS (Fabricius). Fairly common at various times, Apr. to Dec.

P. HYMENEA (Say). Two specimens collected. July 1935.

AGRION DIMIDIATUM (Burmeister). Abundant on Wekiwa R., and found in most other suitable places. Mar. to Nov.

A. MACULATUM Beauvais. Much scarcer than *A. dimidiatum*. Apr. to Aug.

HETAERINA TITIA (Drury). Males are found on the Wekiwa R. every month of the year, and are abundant during the summer. Females are seldom seen. In the males the color of the wings is very variable, and our series is evenly graded from minimum to maximum coloration as follows:—front wing, red extends one cell beyond quadrilateral, barely reaches R plus M, and leaves most of the posterior row of cells uncolored. Brown at tip barely visible. Hind wing, brown extends distally somewhat less than red of front wing; it stops just anterior to the subcosta, and very definitely at Cu2; wing barely tipped with brown.

Maximum coloration, front wing; red extends half way to nodus, to the subcosta, and to the hind margin of the wing. Brown extends to the costa and almost to the nodus. Wing tipped with brown as far back as the stigma. Hind wing completely brown.

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[1] NEEDHAM and HEYWOOD, Handbook of Dragonflies of North America, 1929, p. 253.

All these specimens come from a stretch of river not exceeding four miles in length.

LESTES FORCIPATUS Rambur. All species of *Lestes* have been scarce since 1934, but some years they are abundant in appropriate places. April.

L. VIGILAX Hagen. See *L. forcipatus*. April.

L. VIDUA *Hagen*. See *L. forcipatus*. April.

ARGIA BIPUNCTULATA (Hagen). One specimen, Sept. 1936.

A. FUMIPENNIS (Burmeister). Found all the year, abundant in warm weather.

A. SEDULA (Hagen). Abundant on the Wekiwa R. all the year.

ISCHNURA KELLIKOTTI Williamson. Common in April 1935. Apr. to Dec.

I. POSITA (Hagen). Occurs all the year, usually very common.

I. RAMBURII Selys. Occurs all the year, usually abundant.

ANOMALAGRION HASTATUM (Say). Sometimes abundant in any suitable place, but in 1935 it was rare. Jan. to Nov.

ENALLAGMA CARDENIUM Selys. Abundant all the year when weather is warm.

E. CONCISUM Williamson. Uncommon. Brilliant red and black in life. April.

E. DOUBLEDAYI Selys. Locally abundant. Apr. to Nov.

E. LAURENTI Calvert. Locally common. Oct. and Nov.

E. PALLIDUM Root. Uncommon. Apr. and Aug.

E. SULCATUM Williamson. Locally common. Apr.

E. SIGNATUM (Hagen). Found all the year, abundant in warm weather.

E. VESPERUM Calvert. One male collected Feb. 1937. Seminole Co.

E. WEEWA? Byers. One specimen from the Wekiwa R. is probably this species. March 1935.

TELEBASIS SALVA Hagen. Several caught on Wekiwa R. in spring of 1934. Common in many places in 1935. None seen 1936. Apr. and Nov.

ROBERT E. SNODGRASS, senior entomologist of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, has been elected one of the twelve honorary fellows of the Royal Entomological Society of London.—*Science*, Dec. 10, 1937.

New North American Histeridae (Coleoptera).

By Edward S. Ross, University of California, Berkeley.

Terapus arizonensis new species.

Rufo-ferrugineous, shining. Head very closely coarsely punctate, somewhat depressed in a median line from vertex to clypeus; labrum glabrous, transverse, truncate, edge piceous strongly flexed outward; front acutely margined, carinae interrupted medially, minutely setiferous.

Pronotum one-half wider than long, sides very broadly arcuate; disc sharply convex medially, strongly closely punctate throughout, punctures separated by half their diameter; lateral lobes more finely unevenly punctured, anterior lobe with apical angle truncate, bearing numerous short recurved setae, strongly reflexed, limiting a shallow glabrous depression. Elytra slightly broader than long, densely punctate throughout, except medially along suture, where the surface becomes impunctate and smooth; humeri prominent, bicarinate, inner carina subentire, abbreviated slightly at base and apex, outer carina short, extending from basal margin to apical two-thirds; epipleurae with a distinct, broad, shallow, depressed area in basal third, limited on the inner side by outer humeral carina and exteriorly by a strongly arcuate stria which nearly unites with the latter at the base; apical angles more closely punctate, setaceous.

Propygidium transverse, closely, but not strongly, punctate at base, gradually becoming finer and sparser approaching apex; transverse carinae strong, narrowly interrupted medially, almost impunctate immediately above and below. Pygidium weakly, subobsoletely punctate at base, becoming glabrous apically.

Prosternum very densely, coarsely punctate throughout, bistriate, striae sinuate, strongest at base. Metasternum moderately punctate at base, becoming finer and sparser towards apex; median longitudinal line entire, fine.

Hind femora stout, very closely, strongly punctate on convex outer face, each puncture bearing a short, squamiform, recumbent seta; dorsal surface with a short, distinct carina in basal third. Hind tibiae strongly dilated in basal fourth, deeply concave on inner face, outer face strongly convex, surface similar to that of femora. Length 2.25 mm.; width 2mm.

Holotype (No. 4524 Mus. Calif. Acad. Sci. Ent.) collected by the writer at Patagonia, Arizona, alt. 4000 feet, July 8, 1936. The specimen was taken in flight a day after the first heavy summer rain, consequently no record of the host ant

could be obtained; undoubtedly it occurs in the nests of *Pheidole* as do other species of *Terapus*.

This species is nearest *mnizechi* Mars. and *nigritus* Hntn., but differs from both in its almost complete lack of vestiture, lighter color, almost obsolete pygidial punctuation, and in the form and surface of the hind tibiae. From *infernalis* Fall, it is distinct in many features most notable of which being its much lighter color, stouter legs, and more strongly convex and coarsely punctate outer face of the hind tibiae; in *infernalis* the outer face is very feebly convex and only minutely sparsely punctate.

Hetaerius wagneri new species.

Broadly quadrate-oval, robust; dark reddish-brown, shining; surface very finely punctulate, devoid of vestiture except along lateral margins of pronotum. Head finely alutaceous, sparsely punctate; marginal carinae strong, abruptly arched in front, reverting to apical angles of clypeus; labrum large, concave, smooth glabrous.

Pronotum twice as wide as long, sides gradually convergent; disc moderately convex, obsoletely punctate baso-medially gradually becoming stronger approaching apex, basal margin with a fine but distinct stria strongest in medial third; anterior lateral area broad, strongly, unevenly, longitudinally rugulose; bulla broad, deeply rugoso-punctate; outer marginal sulci of both lobes densely setigerous, setae stout, short, pointed, color same as that of sclerites; oblique sulci deep in basal third, becoming weaker towards apex, abruptly curved inward and joining frontal margin. Elytra one-third wider than long, surface very finely alutaceous, sparsely, finely punctate, strongly convex, epipleurae finely bistriate; striae widely separated, outer humeral strongly cariniform at base, forming a deep groove on inner side, joining inner humeral at base and again at apical three-fourth, inner humeral entire, strong, dorsal at base becoming ventral at apex, the three dorsals entire, cariniform at base, less so approaching apex, basal subhumeral angles with a few short closely set setae.

Propygidium dull, finely alutaceous throughout, very minutely, sparsely punctate, naked. Pygidium convex, surface similar to latter at basal third, becoming smooth and glabrous towards apex.

Prosternum flat, lobe very coarsely punctulate, less so towards base, strongly alutaceous; prosternal striae cariniform,

broadly divergent behind coxae, more feebly divergent before, tips sharply convergent but not meeting. Meso-metasterna anteriorly very deeply depressed, only feebly transversely convex within depression; sternites smooth shining, microscopically punctate. Length 2.75 mm., Width 2.25 mm.

Holotype (No. 4525 Mus. Calif. Acad. Sci. Ent.) collected at Bass Lake, Madera County, CALIFORNIA, on April 1, 1934, by Mr. R. S. Wagner, for whom this species is named as a slight token of gratitude.

This species is allied to *wheeleri* Mann from which it is readily separated by its large size, darker color, total absence of dorsal pubescence, and by the form and sculpture of the pronotum. In *wheeleri* the pronotum is less convex, the oblique sulci are not curved inward apically but are straight and the basal marginal stria is absent. The meso-metasternal depression in this species is more prominent than that of any other species of the genus.

In Martin's key to the species of *Hetaerius* (Ent. News XXXIII, 1922, pp. 292-293) this species runs to *dietrichi* Mart., from which it is at once distinguished by its much larger size, darker color, strongly rugulose anterior lateral pronotal lobe and more robust convex form; *dietrichi* is elongate with more nearly parallel sides. No record of the host ant accompanies the type.

Plegaderas setulosus new species.

Very broadly oblong oval, feebly convex; color ferrugineous; surface punctate, each puncture bearing a short distinct erect scale-like seta. Head finely sparsely punctate.

Pronotum short, one-third wider at base than long; sides feebly sinuate, slightly convergent cephalad, broadly arcuate from just before middle to apical angles; lateral sulci deep, broad, entire; lateral margins broad, feebly convex, punctures coarse, shallow, elongate, separated by half their diameters; outer marginal striae strong; transverse sulcus deep, dividing the pronotum into two nearly equal regions; anterior region strongly evenly convex, punctuation similar to that of head; posterior region more feebly convex, punctures fine and sparse anteriorly, becoming somewhat larger and closer laterally and basally, punctures along basal margin very broad and shallow decreasing slightly in diameter medially. Elytra

one-fourth wider than long, sides strongly evenly arcuate; surface evenly convex, uniformly punctate, punctures broad, shallow, decreasing in depth posteriorly, interspaces less than width of punctures; whole surface presenting a finely, unevenly roughened appearance, somwhat less so along suture; oblique basal striae traceable only by faint indistinct impressions; punctures of inflexed portions nearly confluent.

Pygidium deeply closely punctate, more finely so at apex. Prosternal grooves wide, deep; anterior lobe one-fourth longer than wide, punctures broad, shallow; posterior lobe as wide as long, square, equal in width to posterior portion of anterior lobe. Metasternal plate evenly cribrately punctate. Length 1.2 mm; width .85 mm.

Holotype, deposited in the Canadian National Collection, collected at Hosmer, BRITISH COLUMBIA, on June 7, 1936, by Mr. Hugh B. Leech, to whom I am grateful for the privilege of describing this species.

This species represents a rather isolated development for the genus and cannot be closely compared with any other species of this fauna. It is especially distinctive in the prominence of the setae arising from each puncture of the dorsal and ventral surfaces. Indeed setae arising from punctures is a characteristic feature of *Plegaderas,* but in no other species do they even approach those of *setulosus* in degree of prominence. In the other species the setae are minute and can only be seen under high magnification and special conditions of light. The setae in *setulosus* are scale-like, apically truncate and decreasing in width towards their bases, tending to curl outward. The curious sculpture of the elytra is also without parallel in the genus.

The type was collected in the gallery of an ants nest, *Formica* sp., located in the heart of a rotting Douglas Fir log. This fact suggests a myrmecophlous habit in spite of the fact that all other members of the genus occur under the bark of trees in early stages of decay and have never been reported to occur with ants. Perhaps the specimen was carried into the nest by one of the ants.

Entomology at the Convocation Week Meetings, December 27, 1937, to January 1, 1938.

Our annual summary of the entomological items of the programs of the American Association for the Advancement of Science and Associated Societies held at Indianapolis, Indiana, follows:

The number of papers bearing on insects, including those in symposia and non-duplicating demonstrations, were:

*Entomological Society of America	48
*American Association of Economic Entomologists	103
American Society of Zoologists	21
American Society of Parasitologists	1
*Ecological Society of America	3
*Genetics Society of America	22
Limnological Society of America	1
*American Society of Plant Physiologists	2
*Phi Sigma	4
Potato Association of America	1
*American Nature Study Society	1
Total	207

These papers were distributed in subject as follows:

*General Entomology	10	Genetics	23
*Entomological Instruction	10	Evolution	1
*Cytology	14	*Taxonomy	6
*Embryology and Life History	10	*Parasites and Diseases of Insects	8
*Anatomy and Morphology	9	*Plant Diseases and Insects	5
Physiology	29	*Symbionts of Insects	1
Ecology	8	General Economic Entomology	11
*Behaviour	5	Insecticides	33
Geographical Distribution	3	Apiculture	11
		Arthropods Affecting Man	2

Do. do. other Animals	2
Do. do. Cereals and Field Crops	8
*Do. do. Truck Crops	14
Do. do. Households	3
Do. do. Fruit and Fruit Trees	3
Do. do. Forest and Shade Trees	5

ii.

Acarina	3
Orthoptera	15
Isoptera	3
*Odonata	2
Homoptera	8
Heteroptera	6
Anoplura	1
Thysanoptera	3
Coleoptera (excluding Japanese Beetle)	15
Japanese Beetle	1
*Hymenoptera (excluding Honey Bee)	19
*Honey Bee	12
Trichoptera	1
*Lepidoptera (excluding the three following)	19
Codling Moth	4
Oriental Fruit Moth	1
*Corn Borer	4
Diptera (excluding *Drosophila*)	15
**Drosophila*	19
*Zoraptera	1

Many of these figures are duplications, both between sections i and ii and also within sections. Increase in numbers of papers over the corresponding figures for 1936-1937 are starred (*). Decreases are not indicated. The total number of papers (207) is slightly above that for 1936-1937 (206) and below that for 1935-1936 (239).

Both entomological societies met in the Lincoln Hotel. The Entomological Society was presided over by Prof. O. A. Johannsen, Cornell University; the Secretary was Prof. C. E. Mickel, University of Minnesota. The annual address was given by Mr. P. J. Parrott, New York State Agriculture Department on "Loafing in Africa" at the combined Entomologists' dinner, December 29, at 6.30 P. M.

The President of the Economic Entomologists was Dr. F. C. Bishopp of the United States Department of Agriculture and the Secretary Prof. E. N. Cory, University of Maryland. A joint symposium of the two societies and the American Phytopathological Society on the Relationships between Insects and Plant Diseases was held on December 28. Entomologists were also represented in the symposium of the Limnological Society on Hydrobiology on December 31.

ELSIE LINCOLN.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or last year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the later **within** ( ) follows; then the pagination follows the **colon** :

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499, ill. **Castelnuovo, G.**—Ricerche sulla spermatogenesi del Bacillus rossi (Orthopt., Phasmid.). [Arch. Zool. Ital. Turin] 24: 113-128, ill. **Cockayne, E. A.**—Insect teratology. Reduplication of legs in Coleoptera, Diptera, and Hymenoptera. [36] 86: 191-200, ill. **Cowley, J.**—Tibial and femoral combs, and a trochanteral brush, in the Odonata. [107] A, 12: 123-125, ill. **Das, G. M.**—The musculature of the mouthparts of insect larvae. [53] 80: 39-80, ill. **Elson, J. A.**—see under Hemiptera. **Frazer, F. C.**—A note on the persistence of the primary antenodal nervures in the order Odonata. [107] A, 12: 101-107, ill. **Grandi, G.**—Morfologia ed etiologia comparati di Insetti a regime specializzato. XII. Macrosiagon ferrugineum flabellatum (Coleo.). [Bull. 1st. Ent. R. Univ. Bologna] 9: 33-64, ill. **Ionesco, M. A.**——La Chaetotaxie des stadies larvaires chez le genre Eosentomon (Protura). [28] 58: 101-105, ill. **James, H. C.**—The effect of delayed fertilization on the sex ratio of a species of insect in which the female is the heterogametic sex Ephestia kuhniella, Lepid., Phycit.). [107] A, 12:92-98. **Komp, W. H. W.**—see under Diptera. **Kuhn & Piepho.**—Ueber hormonale Werkungen bei der Verpuppung der schmetterlinge. [Nachricht. Ges. Wissen. Gottingen; Nachr. Biol.] 2: 141-154, ill. **de Lerma, B.**—Osservazioni sul sistema endocrino degli Insetti (corpora allata e corpi faringei). [Arch. Zool. Ital., Turin] 24: 339-368, ill. **Manunta, C.**—Sulle variazioni della proporzione dei due costituenti del secret serico, fibroina e sericina, durante lo sviluppo delle ghiandole in varie razze di Bombyx mori. [Arch. Zool. Ital., Turin] 24: 311-338. Il contenuto inacido urico durante lo sviluppo embrionale della uova di bachi da seta (Bombyx mori). [Arch. Zool. Ital., Turin] 24: 369-383. La distribuzione dei carotenoidi nel bozzolo di varie razze pure di Bombyx mori e di loro incroci. [Arch. Zool. Ital., Turin] 24: 385-401. **Millot & Fontaine.**—Etude physiologique sur les Orthopteres. 1. La teneur en eau du Criquet Pelerin adulte. [Bull. Soc. Hist. Nat. Afriq. Nord] 28: 412-418. **Patterson, M. T.**—The cellular structure of the digestive tract of the beetle, Passalus cornutus. [7] 30: 619-640, ill. **Paulian, R.**—A study of polymorphism in Forficula auricularia (Dermaptera). [7] 30: 558-562, ill. **Pollister, P. F.**—The structure and development of the wax glands of Pseudococcus maritimus (Hemipt., Cocc.). [53] 80: 127-152, ill. **Saito, S.**—On the development of the Tusser, Antheraea pernyi (Lepidop-

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& Hall.—Some morphological differences between the screwworm fly Cochliomyia americana and other closely allied or similar spp. in North America (Calliphor.). [10] 39: 195-200, ill. (k). **Enderlein, G.**—Dipterologica. IV. [Sitzungs. Gesell. Naturf. Freinde Berlin] 1936: 431-444, ill. **Gjullin, C. M.**—The female genitalia of the Aedes mosquitoes of the Pacific coast states. [10] 39: 252-266, ill. (k). **Komp, W. H. W.**—The nomenclature of the thoracic sclerites in the Culicidae, and their setae. [10] 39: 241-252, ill. **Martin, C. H.**—Notes on collecting Diptera [19] 32: 212-213. **Montschadsky, A. S.**—Die Evolution der larven und Ihre Beziehung zu der Evolution der Imagines der familie Culicidae [Russ. with Germ. summ.]. [Bull. Acad. Sci. Un. Rep. Sov. Soc., Cl. Sci.] Ser. Biol., 1937: 1329-1351, ill. **Rempel, J. G.**—Notes on the genus Chasmatonotus with descriptions of three n. spp. (Chironom.) [4] 69: 250-255, ill. (k). **Rozenboom, L. E.**—The egg of Anopheles pseudopunctipennis in Panama (Culic.). [Journ. Parasitol.] 23: 538-539, ill. **Rubzow, I. A.**—Zur Evolution der Kriebelmucken (Simuliidae), [Russ. with Germ. summ.]. [Bull Acad. Sci. Un. Rep. Soviet. Soc.] Ser. Biol., 1937: 1289-1323, ill. **Shields & Miles.**—The occurence of Orthopodomyia alba in Alabama (Culic). [10] 39: 237. **Timon-David, J.**—Recherches sur le peuplement des hautes montagnes. Dipteres de la vallee de Chamonix et du massif du Mont Blanc. [Ann. Faculte Sci. Marseille] 10: 7-54, ill. **Varley, G. C.**—see under Anatomy. **Walton, W. R.**—Attraction of Euxesta notata (Ortal.) to roasted coffee. [10] 39: 201.

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A GLOSSARY OF ENTOMOLOGY Smith's 'An Explanation of Terms Used in Entomology'. Completely revised and rewritten by J. R. DE LA TORRE-BUENO, F.R.E.S. Published by Brooklyn Entomological Society, Brooklyn, N. Y. Printed by the Science Press Printing Co., Lancaster, Penna., 1937. Pp. ix, 336, 9 plates. $5.00, postage, extra.—Prof. John B. Smith's (*not* An) 'Explanation of Terms Used in Entomology' was published in 1906 and consisted of vii + 154 pages and 4 plates. Both volumes have the same page size: 9 x 5⅞ inches, the earlier with a page form 6½ x 4 inches and 47 or 48 lines to the page, the later 7 x 4½ inches and 50 or 51 lines. The type of the former is much smaller (7 point) than that of the

latter (10 point), so that the edition of 1937 is much easier reading. An announcement in the Bulletin of the Brooklyn Entomological Society for April, 1937, page 90, says: "The original Explanation of Terms Used in Entomology contained some 4300 terms. Our new revision will contain nearly 12,000 definitions; and since in many cases, numerous terms with slightly different spellings have the same definition, there will be listed nearly 10,000 terms."

We take these numbers as given, having made no attempt to verify them. They will indicate the fullness of the 1937 version. Most, if not all, of the terms of 1906 are reproduced in 1937, often with the definitions unchanged, and there are of course many additions, drawn, as the 1937 introduction states, from other sciences than entomology in its more limited sense, and with special mention of medical entomology. Very nearly the traditional length of a human generation separates the two editions; those mentioned as taking part in the preparation of the later are all different from those who prepared the earlier. In the body of that of 1906 only rarely is the author of a term given, with the exception of Comstock for venational names. In 1937 authors' names appear much more frequently and one of the valuable qualities of this edition is its inclusion of the often bizarre terms of MacGillivray. Plates I, II and III of the first edition are reproduced here as I, II and IX, as witness the spellings in Pl. II, fig. 11, and illustrate six orders of insects. The new plates III-VIII contain old friends and add but one to the number of orders represented, to our regret. The plate of 1906 illustrating nomenclature of colors has been discontinued. Useful new features are lists of Latin abbreviations and of arbitrary signs and symbols, an alphabetical register of signs and symbols and a two-page bibliography of titles of rather unequal value, to which Tillyard's Biology of Dragonflies might well have been added. Smith's Glossary has been long out of print. Torre-Bueno's Glossary worthily fills the gap and is a necessity to all entomologists.—P. P. CALVERT.

ENTOMOLOGICAL NEWS

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Two Philosamia cynthia Pupae in one Cocoon (Lepid.: Saturniidae).

By C. BROOKE WORTH, Dept. of Biology, Swarthmore College, Swarthmore, Pennsylvania.

I found an unusual cocoon of *Philosamia cynthia,* which contained two pupae, in a vacant lot in the heart of Philadelphia, Pennsylvania, sometime in February, 1937.

So compactly was the cocoon spun that I did not suspect at first that it was anything more than a large "normal" one, probably containing a female pupa. But I was led to suspect something unusual when, on weighing it, I found that its total weight was 7 grams. In a study of weight loss in cocoons of this species (during the course of their slight hibernating metabolism), I had found that male *cynthia* cocoons average 3 grams in weight, and female cocoons average 4 grams. To find a cocoon weighing exactly the same as the sum of the average of both sexes was certainly suggestive of something unusual, especially as the largest female I had found to date weighed only slightly over 5 grams.

External examination of the cocoon did not reveal any great abnormality. There was a clearly defined exit where the cocoon was suspended by its strap. However, I could detect a slightly looser texture in the weaving at the side opposite to the strap.

For the rest, the external aspect of the cocoon gave no evidence whatsoever of its double occupancy; in cross-section it was perfectly circular, with no detectable indentation at any point.

On cutting the cocoon open, I found two pupae, each one oriented with its head toward one of the suggested outlets of the cocoon. The inner wall of the structure was perfectly smooth. There was no trace of a septum between the pupae. The wall of the cocoon was not thicker than normal.

The pupae were male and female. The male occupied the lower position. Examination of these two pupae revealed that they were both of normal size, and each seemed vigorous and healthy. The male, however, was markedly compressed.

This condition indicates that the female was the first to pupate, accomplishing this sufficiently in advance of the male to have hardened into the normal inflexible contour while the male was still soft.

It is likely, I think, that this cocoon would have yielded two normal moths, no matter in which order they hatched; even if the male had matured first, there appeared to be room for him to squeeze past the female and come out of his own "front door." The specimen seemed of sufficient interest, however, to preserve, and it is now in alcohol, in the possession of the Department of Entomology of the Academy of Natural Sciences of Philadelphia.

I do not believe that there was any sexual "design" in the two caterpillars' spinning a joint cocoon. They were more than likely brother and sister, though this would not, of course, exclude the possibility of their future mating. It is more likely, however, that the cocoon was the result of accident. The two caterpillars, of the same age, on the same tree (which was, incidentally, only a small sapling), felt the urge to spin simultaneously and happened to choose the same site for their spinning.

Gene Stratton-Porter records in her "Moths of the Limberlost" the finding of two cecropia cocoons (*Samia cecropia*), spun side by side so as to be slightly interwoven. Remarkable as it may seem, these cocoons contained male and female individuals respectively, and the imagines emerged *simultaneously*, as proved by the execllent photographs which she took.

One is almost forced to regard this occurence as a provision for the mating of individuals, though it is hard to credit caterpillars with such a profound degree of instinctive foresight. And now my *cynthia* cocoon adds a jot of evidence to such a hypothesis, if, indeed, there is any one sufficiently credulous to be interested in such speculations.

Notes on some North American Mydaidae (Diptera)

By MAURICE T. JAMES, Colorado State College, Fort Collins.

Recently, I sent a small collection of Mydaidae to Dr. J. Bequaert for determination, and, after making identifications, pointing out a new species, and making some observations on the collection, he asked me to publish the results. I am greatly indebted to him for his generosity.

Nomoneura micheneri, new species.

♂. Head black in ground color, clothed with dense, white, semi-appressed pile on the occipital orbits, the face, and to each side of the antennae, and with similar, but less dense and more erect, pile on the upper part of the front and on the vertex; this pile is somewhat longer than the combined length of the first and second antennal segments. Antennae black, except the bulbous fifth segment, which is orange-yellow; the first segment twice as long and thick as the second, clothed sparsely with long black and pale hairs mixed; third segment, slender, cylindrical, almost half the length of the entire antenna; the fourth segment approximately the length of the second; the fifth expanded bulblike, its greatest width being preapicad; the antennae elbowed at the apex of the third segment. Proboscis black, slender, extending approximately to the apex of the antennae.

Thorax black, shining, with dense conspicuous, white pile which covers the humeri and the following areas on the dorsum: the lateral margins, the anterior margin, except the median third, and a partial stripe on each side, extending backward almost to the suture and just outside the median third; this pile is appressed, except that on the humeri, which is semi-appressed; a similar area of semi-appressed pile occurs below each wing base, and there is a small tuft of it at the base of the scutellum. Posterior calli somewhat elevated. Halteres black. Legs black, the knees and tarsi brownish. Wings hyaline; the first posterior cell closed.

Abdomen black ventrally on the first six segments; the first and second entirely black, the third to sixth inclusively reddish dorsally, their lateral margins and narrow apices, however, black; genitalia mostly reddish. First segment with a considerable amount of rather long semi-appressed whitish pile; the second segment with a basal tuft of appressed whitish pile on each side; the remaining segments with inconspicuous black appressed pile on the disc and with conspicuous silvery tufts

at the posterior corners. Length, 10 mm.

♀. Similar to the male, but the pile is much shorter and sparser, the dense covering of the head being especially reduced; on the abdomen the segments beyond the first are practically devoid of pile dorsally. The pile of the thoracic dorsum is similar to that of the male, but more reduced in area. Tibiae and genitalia brownish, the latter with four spines on each side. Antennae broken off at end of second segment.

Holotype ♂, *allotype* ♀, on one pin, taken in copulation, seven miles south of White Water, Riverside County, California, April 13, 1935 (C. D. Michener).

Of the species included in Johnson's key to *Leptomydas,* three evidently belong to *Nomoneura,* as defined by Curran in his "North American Diptera." These three, *hirta* Coq., *concinna* Coq., and *venosa* Loew, together with *micheneri,* are the representatives of this genus in the United States. *Micheneri* has a longer proboscis than the other species, and the coloration of the abdomen is quite different; the abdomen of *venosa* ♀ is entirely pale, while those of *venosa* ♂, *hirta,* and *concinna,* are banded with black and yellow.

PHYLLOMYDAS BRUSEI Johnson. ♂, foothills west of La Porte, Larimer Co., Colorado, July 22, 1935 (M. T. James). On sage brush. This specimen was compared with the type by Dr. Bequaert, who informs me that it has been recorded only from the type locality, Galveston, Texas.

I have the following records for other Mydaidae, all determined by Dr. Bequaert.

MYDAS MACULIVENTRIS Westw. Miami, Florida, Aug. 6, 1934 (Frank N. Young).

M. MACULIVENTRIS var. INCISUS Macq. Miami, Florida, Aug. 9, 1934 (Young); Coconut Grove, Fla., June 18, 1934.

OPOMYDAS CARBONIFER O. S. Lloyd, Jefferson County, Florida, Aug. 9, 1935 (G. Fairchild).

NOMONEURA VENOSA Loew. Globe, Arizona (Duncan); Roggen, Colorado, Sept. 8, 1933 (M. T. James); between Trinidad and La Junta, Colorado, Aug. 8, 1933 (H. G. Rodeck, M. T. James). The latter specimen was taken, in rather good condition, from the radiator of our car.

Notes on Western Conifer Aphids (Homoptera: Aphididae).[1]

By G. F. KNOWLTON and CLYDE F. SMITH.

The following report adds to the known distribution of several conifer aphids, two species and a sub-species being described as new[2].

CINARA BREVISPINOSA (G. and P.). On *Pinus contorta* twig bark at Boise, Idaho, July 16, 1936 (T. O. Thatcher).

C. CURVIPES (Patch). On Engelman spruce at Pingree Park, Colorado, August 21, 1935 (G. F. Knowlton).

C. FERRISI (Swain). On *Pinus albicaulis,* Moose Green, near Karsts' Ranch, Montana, July 8, 1936 (Thatcher).

C. GLEHNA (Essig). On *Picea pungens* twig bark at Salt Lake City, Utah, June 12, 1935 (Knowlton).

C. HOTTESI (G. and P.). On twig bark of *Picea engelmannii* at Pingree Park, Colorado, August 21, 1935 (Knowlton: M. A. Palmer).

C. MEDISPINOSA (G. and P.). On young twig bark of *Pinus contorta* at Boise, Idaho, July 6, 1936 (Thatcher,), and Beaver Creek, Logan Canyon, Utah, July 25, 1837 (C. F. Smith: C. K. Smith).

C. MURRAYANAE (G. and P.). On twig bark of *Pinus contorta* at Boise, Idaho, July 6, 1936; and Mountain View Peak, Rogerson, Idaho, May 12, 1936 (Thatcher).

C. OCCIDENTALIS (Davidson). On twig bark of *Abies lasiocarpa,* Minidoka National Forest, Idaho, May 31, 1935 (Thatcher).

C. PINI (L). On *Pinus sylvestris,* Campus, Utah State Agricultural College, Logan, Utah, July 26, 1937 (Smith: C. J. Davis).

C. PONDEROSAE (Williams). On *Pinus ponderosa* twig bark west of Meaw Meadows, Idaho, June 13, 1936 (Thatcher); Yellowstone National Park, Wyoming, July 18, 1936 (Knowlton); Gallatin Valley, Montana, July 14, 1936 (Knowl-

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station. Authorized by the Director.

[2] The writers are indebted to Professor M. A. Palmer for her opinion concerning various species herein recorded.

ton); and Nederland, Colorado, August 23, 1935 (Knowlton).

C. SIBIRICAE (G. and P.). On *Juniperus sibirica* at Pingree Park, Colorado, August 21, 1935 (Knowlton).

Cinara thatcheri n. sp.[3]

Alate vivipara.—Size 4mm. long and 1.75 wide through eyes; ocular tubercles present; antennae 1.61 long; antennal III, 0.57 to 0.6 mm. long with 3 to 6 sensoria; IV, 0.25 to 0.28, with 1 to 3 sensoria; V, 0.3 to 0.33, with 1 secondary sensorium; VI, 0.153 to 0.16 + 0.047 to 0.05; last three segments of acute rostrum measuring 0.21 to 0.22, 0.28 to 0.3, and terminal segment 0.11; hind tibiae 2.83 to 2; hind tarsi 0.395; cornicles 0.3 to 0.46 across longest part of base; dusky patches occur on the two dorsal segments preceding the cauda; small, dusky spots partly surround spiracles and occur on other dorsal segments.

Apterous vivipara.—Size 4.5 mm. long 2.4 wide through abdomen and 0.78 through eyes; antennae 1.6 to 1.65 mm. long; antennal III, 0.53 to 0.634, without sensoria; IV, 0.25, with 1 sensorium; V, 0.285 to 0.32 with 1 secondary sensorium; VI, 0.146 to 0.155 + 0.047 to 0.05; penultimate segment of rostrum 0.29 to 0.3 mm. long; rostrum reaching nearly to end of abdomen; hind tibiae 2.6 to 2.83 hind tarsi 0.36 to 0.39; cornicle 0.4 mm. across base longest way.

Collections.—On *Pinus ponderosa* at White Bird Summit, IDAHO, June 13, 1936 (T. O. Thatcher).

Taxonomy.—Professor M. A. Palmer called the writers' attention to the fact that the sub-terminal segment of the rostrum in *Cinara thatcheri* is noticeably longer than is the case in its near relative, *Cinara schwarzii* (Wilson), in which it is 0.2 to 0.23 mm. long; also antennal V always is longer than IV.

C. TAXIFOLIAE (Swain). On twig bark of *Pseudotsuga taxifolia* at Antelope Flat, near Ashton, Idaho, July 18 and 27, 1936 (Thatcher).

Cinara utahensis n. sp.

Apterous vivipara:—Color brownish-black, shiny; body 4.5 to 4.72 mm. long and bearing hairs 0.06 to 0.07 mm. long on abdomen; vertex hairs 0.10 to 0.12; hairs on antennal III, 0.04 to 0.06; antennae 2.2 to 2.3 mm. long; antennal III, 0.78 to 1.04 mm. long and bearing 1 to 3 sensoria; IV, 0.28 to 0.35 bearing 1 to 2 sensoria; V, 0.37 to 0.45 with 1 sensorium;

[3] Types of new species are deposited in the U. S. National Museum. Paratypes in the G. F. Knowlton and C. F. Smith collections.

VI, 0.125 to 0.14 + 0.065 to 0.10 mm.; rostrum attaining cornicles; rostral IV + V, 0.33 to 0.37; hind tibiae 3.76 to 4.6 mm. long and bearing pointed hairs 0.096 to 0.117 mm. long; first joint of hind tarsi 0.06 to 0.08 mm. on the outer side, 0.16 on inner side; second joint 0.34 to 0.37; cornicles 0.53 to 0.61 mm. across base.

Alate vivipara:—Antennal III, bearing 9 to 12 sensoria; antennal IV, 2 to 3 sensoria; hairs on vertex 0.08 to 0.09;

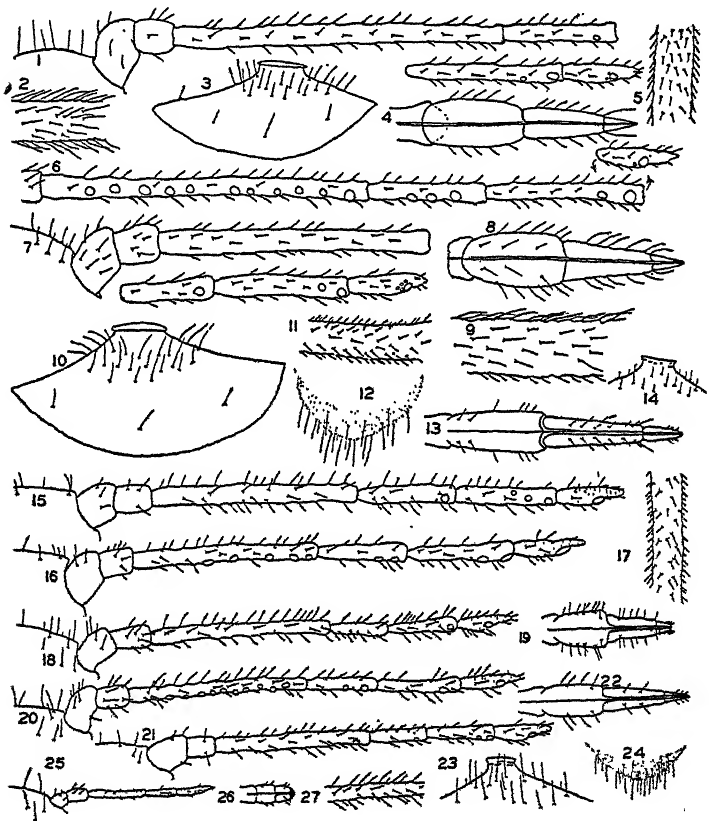

Fig. 1. *Cinara utahensis* n. sp. Aptera, 1-4; alate 5-6. *C. utahensis zoolathridi* n. subsp. Aptera, 7-10. *C. thatcheri* n. sp. Aptera, 11-15; alate, 16-17. *C. taxifoliae* (Swain). Aptera 18-19; alate, 20. *C. brevispinosa* (G. and P.). Aptera, 21-24. *Essigella fusca* G. and P. Aptera, 25-27.

hairs on hind tibiae 0.045 to 0.047; other characters as in apterous vivipara.

Taxonomy.—This species differs from *C. coloradensis* (G. and P.) in diameter of cornicles being greater; tibial hairs longer and less rigid, these being longer than one-half the diameter of the hind tibiae; and in having a secondary sensorium on antennal *V*. *C. utahensis* differs from *C. curvipes* (Patch) in having fewer sensoria on apterous antennal III, and averaging more secondary sensoria on antennals IV and V; in tibial hairs being longer (more than half the diameter of the joint) and pointed; hind tarsi being more than 0.1 of hind tibiae. This species runs to *C. edulis* (Wilson) in Gillette and Palmer's key (Ann. Ent. Soc. Amer. 24: 844) from which it differs in angle of hairs on hind tibiae being less than 45 degrees; and in being a larger species.

Collections:—On *Abies lasiocarpa* in Smithfield Canyon, UTAH, July 18, 1937 (W. P. Nye: C. J. Davis).

Cinara utahensis zoolathridi n. subsp.

Apterous vivipara.—Body reddish-brown, 3.7 to 5.4 mm. long; antennae 2 to 2.5 mm. long; antennal III, 0.8 to 0.92 mm. long and bearing 0 to 2 sensoria on distal half; IV, 0.29 to 0.35 mm. with 1 to 2 sensoria near distal end; V, 0.41 mm., bearing 1 to 2 secondary sensorium near distal end; VI, 0.15 to 0.16 + 0.063 to 0.082; rostrum lance-like, usually surpassing cornicles; rostral IV + V, 0.34 to 0.38 mm.; hind tibiae curved, 4 to 5 mm. long, bearing numerous thin hairs 0.062 to 0.086 mm. long; first joint of hind tarsi 0.09 on the inner side and 0.19 on the outer side; second joint 0.39; cornicles 0.35 to 0.42 mm. in diameter across base.

Collections.—On spruce trees in nursery, Portland, OREGON, 1934 (C. Chamberlin).

Taxonomy:—This sub-species differs from *C. utahensis* n. sp. in having slightly shorter hairs on vertex; hairs on antennae being less spine-like; and in having thicker antennae and hind tarsi. From *C. curvipes* (Patch) it differs in base of VI being shorter; wider base of cornicles; and hairs on hind tibiae being longer, thinner and less blunt.

SCHIZOLACHNUS PINI-RADIATAE (Davidson). On needles of *Pinus ponderosa* in Dixie National Forest, Utah, August

10, 1936 (Knowlton: C. F. Smith).

ESSIGELLA FUSCA G. and P. On *Pinus* needles at Heron Creek, Wyoming, July 18, 1936 (Knowlton); and Pingree Park, Colorado, August 19, 1936 (Knowlton).

Description of and Notes on the Early Stages of Hyloicus canadensis Bdv. (Lepidoptera: Sphingidae).

By WALTER J. CLAYTON, Lincoln, Maine.

The following descriptions were made of larvae from eggs laid by three female moths taken at Lincoln, Maine, by myself. The first was taken at 1 A. M. on June 30, 1937, at a street light. She laid a few eggs that night and a total of 110. The larvae emerged on July 5th. The second moth laid only 19 eggs and the third 118. This last female seemed less vigorous than the others and many of the larvae from her batch of eggs did not survive moulting.

The newly-hatched caterpillars ate most of their eggshells after emerging. Those of the first brood grew to maturity and stopped eating 21 days after hatching, and on July 26th began to roam around, considerable moisture exuding from the first three or four segments. The larvae from the eggs of the second and third females went through their development in exactly the same length of time.

The larvae from the first mentioned brood had a large number of the red-colored examples in it, and the second and third lots were inclined to be rather dark, merging into reddish brown markings, but, like the others, lost most of the dark color in the last stage.

The caterpillars were quite frail and had difficulty in passing the first moult in which many died, but those which survived had little trouble in passing the other moults. It was necessary, however, to rear the larvae singly.

The larvae from the first brood were, on the whole, a brighter sort of reddish-rust color and were much brighter than the caterpillars of the other two broods. In the end, though, the caterpillars of all three broods were much alike in color with white back, green sides and reddish shades showing faintly in some.

When they stopped feeding, the caterpillars were placed in a box of dirt to which a cover was fastened with nails. This cover had a hole cut in the top of it. through which the larvae were dropped when they were ready to pupate. The interior of the box was dark and most of the caterpillars pupated under and among leaves scattered on top of the soil. A few burrowed into the earth one or two inches. They walked around the box sometimes for two or three days before becoming quiet. Few caterpillars were lost during this period. After three or four days some had shed the larval skin, but others were a week in doing this.

The moths are on the wing from the last week in June and some have been taken as late as the first week in August. A total of seven was taken this year. Although several years of collecting in Lincoln has yielded from three to seven moths annually, no female has been taken until this year, and no larva has ever been found in the wild state.

Egg. The eggs were pale green, much like that of *H. chersis* Hbn., but only about half as large. They hatched five days after deposition.

Larva. The larvae, at hatching, were 7/32 of an inch in length, very pale yellow to almost white, the caudal horn light, (turning dark in about 15 minutes) straight and held very erect. The caterpillars were given black ash (*Fraxinus nigra* Marsh) and low bush blueberry (*Vaccinium* sp.). They would not touch the blueberry, but after considerable wandering attached themselves to the veins on the underside of the leaves of the ash and soon began to reach out at right angles, first eating only the surface, then a hole through the leaf. The larvae, when a little older, ate a hole and then continued it to the edge of the leaf.

First moult. The first moult occurred five days after hatching. The larvae were 9/32 of an inch in length and up to now very transparent. By holding up to the light and with an ordinary reading glass, pellets of food could be seen passing down to the stomach. A very pale subdorsal stripe on both sides ran from the fourth segment to the caudal horn. Seven pale oblique stripes on the sides came out of the subdorsal stripes and a pink spot was situated above the oblique and below the subdorsal. These became more conspicuous before the next moult.

Second moult. This occurred 5 days later, and the caterpillars were ¾ of an inch or slightly more in length. Considerable changes took place now and before the next moult. About half of the lot looked much like *H. chersis* in some ways, the rest were decked out in rust-red, reddish brown, and some were nearly chocolate brown. They varied considerably in brightness and in amount of color, but all were much whiter than *H. chersis* on the back. The first three segments were pale green dotted with white granulations, the remainder of the body beneath and half-way up the sides was pale green with white dots like *H. chersis.* The head was triangular, considerably notched at apex, and green with yellow vertical stripes. The caudal horn was reddish or brown at tip and somewhat curved. It was darker basally and in some larvae the last two segments were rusty, brownish, or reddish. Some had oblong reddish spots above the subdorsal stripe. Most of the rust or reddish markings were edged with very pale yellow. The terminal segment was much dotted with raised black spots. The spiracles were rose, edged with pale yellow. The colors became brighter as the caterpillars neared the next moult. Two larvae were very dark green, like the greenest type of *H. chersis.*

Third moult. Five days after the preceding moult this one occurred. The larvae were 1¾ inches in length, and were little changed in color although some were brighter than in the preceding instar, and a number had lost most of the reddish markings. Most, however, were the green, white-backed type and were largest from about the middle of the body to the caudal end, and tapered from the middle to the small head. The head was not as much notched as in the preceding instar, and the caudal horn, while it had previously shown a tendency to droop, was now pointing nearly straight out behind.

Full-grown larva. The full grown larvae may be described as follows: Length 2½-2¾ inches; the first three segments, the under parts and the lower part of the sides were all light green dotted with white granulations. The head was deep green with pale yellow vertical stripes on the sides, triangular, and somewhat notched at the apex. The legs were the same as in *H. chersis.* The upper part of the body was nearly white. The seven oblique stripes were slightly yellow at the lower end, becoming whiter than the dorsum at the upper, and were edged above with sharply contrasting dark green. The obliques crossed one segment and two-thirds or more of the next, and some larvae showed some of the washed-out reddish color of the second instar. The caudal horn was green, tipped with reddish or

brown. curved and heavily spiked with black spines located mostly in front and in back. The last segment was green dotted with raised, black granulations. The spiracles were rose-red edged with pale yellow.

In this stage the following should distinguish it from *H. chersis*: much like *H. chersis* but smaller (2½-2¾ inches as against 3½-4 inches in length for *H. chersis* and less than half the diameter). The caudal horn is grass green, never bluish or yellowish as in *H. chersis*. While there was considerable variation in colors, all the larvae were very white on the dorsum, never bluish or yellow, and the terminal plates had raised black dots (granulations). It should be clearly understood, moreover, that while the larva of *H. canadensis* has been compared with that of *H. chersis*, the two are not to be confused in their red phases. That of *H. chersis* is dull red all over, while that of *H. canadensis* is of spots and blotches of a different shade of red. The latter species also present an almost unlimited degree of variation in the extent and arrangement of spotting, and, if any segments are entirely red, it is only the last three or four with the remainder of the dorsum white as in all the spotted varieties.

Pupa. The pupae are 1 13/32 inches long, ⅜ of an inch in diameter, and are dark brown. A short tongue case is present, humped up in the middle, and touching at the slightly enlarged tip. The pupa is difficult to separate with certainty from that of *H. luscitosa* Clem., and is the same size and color.

Descriptions of some North American Micropezidae (Diptera).

By EZRA T. CRESSON, Jr., Philadelphia, Pennsylvania.

The following species were encountered while working on a revosion of the Nearctic species of this family.

Micropeza abnormis new species.

Similar to the European *M. corrigiolata* (Linn.) differing most noticeably in having the antennae pale in both sexes, in the form of the claspers and in the color of the ovipositor.

♂, ♀. Black as follows: Head except face, bucca, lateral and posterior-oral margins; antennae; thorax except areas around coxae; tarsi; abdomen except male genital segments, claspers and first segment of ovipositor. Pale genitalic segments of male with median dark spot. Basal segment of ovipositor reddish to yellowish. Coxae, femora and tibiae pale except a disto-median and apical flexor spots on femora, and

apices of tibiae. Palpi and wing veins dark. Arista white; halteres pale.

Thorax and abdomen more or less cinerous but never densely so. Otherwise surfaces more or less shining; the face with usual silvery reflection.

Head relatively stout, almost as high as long (as 27:30); the postorbital swelling about .3 length of head. One notopleural bristle; no pectoral pile or pile on posterior surface of hind femur. Marginal setae on tergites and sternites not conspicuous but discernable in the female sex.

Claspers situated distad close to genital segments, small, scarcely as long as length of tergite V, turgid, their apices rather knob-like, curving mesad hood-like; their cephalic surface sparingly black pilose. Second vein almost straight in entering costa; third costal section .25 length of ultimate of vein IV; first posterior cell closed or nearly closed in margin.

Length: 4-4.5 mm.

Type.—Male; Baboquivari Mountains, ARIZONA, (R. H. Beamer; July 19, 1932), [Kans. Univ. Colln.]. *Paratypes.*—5 ♂, 4 ♀; with same data.

Micropeza compar new species.

Structurally similar to *Micropeza turcana* Townsend (1892); but paler in color, and antennae of the male yellow.

♂. Pale species, with black to ferruginous as follows: Ocellar spot, broad lateral margins of vertex attentuated to foramen, median line on mesofrons, small foveal spot; four antesutural lines, the lateral one abbreviated cephalad but extending postsuturally, a paler median postsutural line extending onto scutellum, broad pleural band and metanotum. Tergites more or less brownish except at margins, the usual sinstral black spot on genital segment distinct. Arista black. Femora with more or less distinct disto-median extensor spot and their apices dark; apices of tibiae and all tarsi, black.

Head robust about 1.5 longer than high; pectoral and hind femoral pile very sparse; claspers large, broad, easily attaining base of abdomen, with apical fingers comparatively but slightly curved.

♀. Similar to the male but darker; antennae showing some infuscation but never intensely black and the third always pale at inferior margin; dark markings somewhat more extensive and the tergites showing very narrow pale margins; ovipositor segment dark basally.

Length: ♂, ♀ exclusive of ovipositor, 6 mm.

Type:—Male; Huachuaca Mountains, ARIZONA, July 8, 1932,

(R. H. Beamer). [Kans. Univ. Colln.]. *Paratypes.*—1 ♂; 2 ♀; topotypical. 3 ♀, Chiricahua Mountains, July 8, 1932; and 1 ♀, Santa Rita Mountains, Arizona, July 7, 1932; (all R. H. Beamer).

Micropeza atra new species.

Although the male of this species is unknown, I suspect, from the general habitus of this female that we have a species of the *turcana* group, and I further suspect that the male will prove to have the genitalic development of this group and that the claspers will be short of the *lineata* type.

I would hesitate to erect a new species on the female sex, but here we find one that is so distinct in having the thorax entirely black and more densely pollinose than is usual with the other species of this group. I cannot consider it a dark variety of *setaventris* because of its lacking the characteristic sternal setae of that species; and I do not think it can be an extreme, dark form of the *turcana* assemblage. It should not be confused with either *abnormis* here described or *nitida* Hennig, both belonging to other species groups.

Black, including antennae and arista, the former of which however may be brownish. Yellow to tawny are: the face, oral margin, mouthparts, prosternum, all coxae, halteres, very narrow apices of tergites. Fore femur black, pale basally; mid and hind femora tawny, darker basally and at extreme apices; tibiae and tarsi black. Wing veins brownish.

Head mostly shining to polished, with the usual cinereous postocellar area and the silvery facial reflections. Mesonotum rather densely cinereous, but not opaque, becoming shining towards humeri; pleura somewhat niveous. Scutellum and notopleura similar to mesonotum. Abdomen sparsely brown pollinose. Ovipositor polished.

Head robust about 1.5 as long as high. One notopleural bristle. Sternites narrow, inconspicuously setose laterally; ovipositor segment about as long as the abdomen. Third costal section about .5 as long as the ultimate of vein IV; first posterior cell open.

Length, 5 mm. excl. ovipositor.

Type.—Female: Flagstaff, Coconino County, ARIZONA. June 7, (H. S. Barber), [U. S. N. M., no. 27059].

Micropeza setaventris new species.

Similar to *M. turcana* Townsend (1892) but postorbital

region and occiput black as are also the entire mesonotum and lower portion of pleura.

♂, Mostly black with following pale yellow to reddish: frontal orbits above; narrow area around ocelli; face, oral margin, notopleural stripe, supra-alar margin of mesonotum, pectal margin of sternopleura and halteres; more or less of abdomen beyond tergite II and claspers; coxae and legs except tarsi. Apical flexor spot on femora and apices of tibiae are dark.

Head robust, about 1.5 as long as high; claspers short, not nearly attaining base of abdomen, very strongly setose apically; hind femora with some flexose pile on posterior surface.

♀. Similar to the male but darker, the pale markings being reduced; abdomen except narrow margins of tergites, black; sternites with lateral margins bearing long setae which are longer than width of sternite, interspersed with smaller setae.

Length, ♂, ♀ exclusive of ovipositor, 2.7 to 4 mm.

Type.—Male; Fort Duchesne, Uintah County, UTAH, June 28, 1937, (G. F. Knowlton), [A.N.S.P. no. 6536].

Partaypes:—1 ♀ topotypical, with same data. 9 ♂, 11 ♀; Hooper, Weber County, July 15, 1937 (D. E. Hardy). 1 ♂; Huntsville, Weber County, July 10, 1937 (G. F. Knowlton). 1 ♂, 3 ♀; Smithfield, Cache County, July 11, 1937 (Smith & Harmston). 1 ♀; Richmond, Cache County, July 2, 1937, (G. F. Knowlton). 1 ♂; Bingham Canyon, Box Elder County, July 15, (Knowlton & Harmston), all in Utah.

Micropeza texana new species.

Very similar to *M. producta* Walker (1849) but distinct in its trivittate mesonotum.

♂. Yellow to ferrugineous including palpi. Black to brown are: vertex and upper half of postorbital region and occiput except narrowly around ocelli, a narrow line including outer verticals, frons, foveae and antennae (arista pale but not niveous); a median antesutural and two postsutural stripes on mesonotum, the median one continuous narrowly caudad, the others continued broadly cephalad of the suture and attenuated caudad, scutellum except pale apex; pleural line including propleural scale and continuous with the black metanotum; a pectoral line; abdominal tergites except narrow margins; two spots on male genital segment; distomedian and apical rings on femora; broad apices of tibiae and all tarsi. Halteres dark in part.

More or less shining species but mesonotum and particularly

the pleura are distinctly cinereous, almost obscuring the ground color pattern; abdomen as usual somewhat grayish and subopaque. Venation rather dark.

Head slender and elongate, about twice as long as high (as 30: 15); two notopleurals. Tergites II and IV slightly longer than V and VI. Claspers of male similar to those of *producta* but the fingers more slender; styli also similar to those of *producta* but the longer lateral prong is more slender and thorn-like. Second vein rather abruptly curving into the costa, apportioning the third costal section to about .3 of ultimate of vein IV. First posterior cell closed and petiolate.

Length, 4 mm.

Type.—Male; Corpus Cristi, Nueces County, TEXAS, (F. C. Pratt; April 13, 1906), [U.S.N.M., no. 27061]. *Paratype.*—1 ♂; topotypical with same data.

Taeniaptera brunneipes new species.

Similar to *Calobata antennaepes* Say, 1823, but darker. Third antennal segment black; the usual disto-medial dark ring of mid and hind femora broader extending almost to base of these members; the mid and hind metatarsus almost as dark as the distal segments.

Type.—Male; Broad Creek, near Washington, DISTRICT OF COLUMBIA, May 19, 1922, (E. G. Vanatta; from Bald Eagle's nest), [A.N.S.P., no. 6288].

Paratypes.—1 ♂, 1 ♀; topotypical with same data. 1 ♂, 2 ♀; Swarthmore, Delaware County, PENNSYLVANIA, June 18, 1905, June 10, 1906, July 4, 1907, (E. T. Cresson, Jr.).

An Annotated List of The Butterflies of Nebraska (Lepid.: Rhopalocera).

By R. A. LEUSSLER, Omaha, Nebraska.

(Continued from page 9.)

19. EUCHLOE AUSONIDES (Bdv.) race COLORADENSIS (Hy. Edw.). Apparently confined to the western part of the state, where it flies on the pine-clad slopes. Sioux County, May 27 and July 10, 1900 (Wolcott) and June 5, 1919 (Leussler). The form found here is identical with that found in the Front Range, Rocky Mountains, Colorado. It differs from the Pacific Coast form in the smaller size, and more slender discal black spots of primaries.

20. ZEGRIS OLYMPIA (Edw.) race ROSA (Edw.). Rare. One specimen, Omaha, May 4, 1926, 1 from Omaha, May 24,

1929, and 1 from Plattsmouth, May 13, 1936. All 3 specimens are race *rosa,* distinguished by the very lightly marked apices in contrast with the more heavily marked apices noted in a long series from the sand dunes at Millers, Indiana. The late E. A. Dodge also reported collecting a specimen in Dodge County.

21. ANTHOCARIS MEDEA (Hbn.). I have seen no individuals actually on the wing in Nebraska. However, Dr. Wolcott found a specimen in a small collection of local butterfflies made at Crete, which was said to have been captured there by the owner of the collection. Prof. Lawrence Bruner also reported having taken specimens near Omaha years ago.

22. CATOPSILIA SENNAE (L.). Typical *sennae* is rare in Nebraska. One specimen, near Omaha, September 19, 1914, closely resembles Texas specimens in the peculiar shade of yellow, flushed on secondaries with orange, and with the margins heavily edged with brown.

C. SENNAE form EUBULE (L.). Fairly abundant as a rule in the eastern part of the state. August and September. Omaha, Lincoln, Roca, Papillion and Kearney.

C. SENNAE form ♀ PALLIDA (Ckll.). Rare. One specimen, very pale creamy-white with heavy brown margins, taken in copula with a male of *eubule,* Plattsmouth, August 12, 1931. Another, pale greenish yellow with heavy brown margins, Omaha, September 29, 1933.

23. C. AGARITHE (Bdv.). One male, taken at Glencoe, Dodge County, by the late E. A. Dodge in the summer of 1876, and now in the writer's collection. Undoubtedly a straggler.

24. C. PHILEA (Joh.). One male, taken at Plattsmouth, August 12, 1931. Wings somewhat frayed, suggesting long flight. No doubt a straggler.

25. AMYNTHIA MAERULA (F.). One female taken at Omaha, September 20, 1921 (Leussler). This is not *clorinde* (Godt.) nor *maerula* (Hbn). It agrees perfectly in size and shape with the figure of *maerula* (F.) in Seitz. It is a pale, dirty yellowish-white, quite different from the ground color of *clorinde* and it lacks the orange splash on the primaries of the

latter. The brown spot on primaries is identical with that in Seitz's figure, and the spot on secondaries is pale orange, circled with brown, not brown surrounded by orange as in *clorinde,* The under side is decidedly more green that *clorinde,* and the median spots are white bordered with reddish, altogether different from those of *clorinde.* It fits perfectly the description of the female *maerula* (F.) as set forth in the text in Seitz. The wings are somewhat frayed showing long flight. This species is not listed in Barnes and Benjamin's check list, and has not, so far as I am aware, been recorded from north of the Mexican border.

26. KRICOGONIA LYSIDE (Godt.). Another straggler. One battered specimen, taken at Roca, May 10, 1911.

27. ZERENE CAESONIA (Stoll). Fairly common in the eastern part of the state. The first brood in June, the second, in August and September. Has also been taken near Harrison, in the northwestern part of the state. The species is quite variable in the amount of orange flushing on secondaries and in the width and form of the black border on secondaries.

Z. CAESONIA gen. auctum. ROSA (M'Neill). Some splendid examples of this form found in September and October. Not all the individuals of the fall brood have the under side of secondaries pink, but most of the females have more or less. In some the under side of secondaries is solidly pink. Apparently form *rosa* is confined to the female sex, for although common among the females of the fall brood I have seen no males which I could refer to this form. The males of the fall brood which correspond to the female *rosa* in their tendency toward pink under side apparently are form *rosea* (Roeber). The pink on the under side of the males is confined, besides the laving at apex of primaries, to two streaks radiating from the base of secondaries, a series of irregular shaped small spots forming a band parallel to outer margin of secondaries, a similar series on primaries not quite reaching the inner margin. The edge of both wings is also narrowly margined with pink. On the upper side the black border of hind wings is replaced by narrow streaks which are broadened at the end of veins, forming an inverted T. A percentage of females of the fall

brood also possess all of these characters.

Z. CAESONIA ab. IMMACULSECUNDA Gunder. Two females, Omaha, October 3, 1928. One male, Omaha, September 29, 1933, has slight vestiges of marginal border, thus approaching *immaculsecunda.*

28. EURYMUS EURYTHEME (Bdv.). Common over entire state. The spring form of this species in the eastern part of the state is what has been known as *keewaydin,* occasional specimens approaching *ariadne* in the restricted amount of orange on primaries. On the other hand many show almost as much orange as *amphidusa,* and intergrades of every degree are found. Albinic females (ab. *alba* Stkr.) also are found in the early generation.

E. EURYTHEME form AMPHIDUSA (Bdv.). One of our commonest butterflies. Wherever there is a clover or alfalfa field swarms of this butterfly will be found. June to October. Albinic females (ab. *alba* Stkr.) are now much more common than formerly. During August and September individuals of both sexes in which the ground color is pure yellow (ab. *flava* Stkr.) are not uncommon.

E. EURYTHEME form ERIPHYLE (Edw.). Found in the western part of the state. Specimens from Banner and Sioux Counties.

29. E. PHILODICE (Godt.). Fairly common in the eastern part of the state, though less so than the preceding species, and also less common than formerly. Albinic females (*alba* Stkr.) are occasionally found but are rather rare. Orange tinted individuals (ab. *hybrida* Stkr. = *luteitincta* Wolcott) are also found. The latter have been taken at Omaha, April 10, 1910; June 19 and 26, 1910; Blair, September 19, 1920.

E. PHILODICE gen. vern. ANTHYALE (Hbn.). Small, extremely narrow-bordered individuals have been taken at Omaha, Cedar Bluffs and Harrisburg.

30. E. ALEXANDRA (Edw.). This handsome species is found in the western part of the state. I have taken it in abundance in the vicinity of Harrison.

E. ALEXANDRA race EDWARDSII (Edw.). Rare. One specimen, Warbonnet Canyon, June 24, 1901. (Merritt Cary); 1, Monroe Canyon, August 18, 1912; 1, June 16, 1929.

31. EUREMA MEXICANA (Bdv.). Found in fair numbers throughout the state in late September and early October; occasionally also in June. Has been taken at Omaha, Lincoln, Roca, Meadow, Fremont and Harrison.

32. E. NICIPPE (Cram.). Rare. Single individuals have been taken at Omaha, Lincoln, Roca, Cedar Bluffs and McCook.

33. E. LISA (Bdv. and Lec.). Common over the greater part of the state. Apparently two broods, July to October. Occasional females are found which are very pale, almost white (form ♀ alba Stkr.). These albinic females I have found only in the fall.

34. DANAUS MENIPPE (Hbn.). Common over the entire state, particularly so in late summer and fall, although it makes its appearance as early as April and May. One dwarfed specimen of ab. *fumosus* (Hlst.) was taken at Omaha, July 8, 1910.

(To be continued.)

OBITUARY

DR. GEORGE HENRY FALKINER NUTTALL, emeritus professor of bioloby at the University of Cambridge and lately director of the Molteno Institute for Research in Parasitology, died on November 16, at the age of seventy-five years (*Science*, December 24, 1937, p. 581.)

Among his well-known publications are: On the rôle of insects, arachnids and myriapods as carriers in the spread of bacterial and parasitic diseases of man and animals (John Hopkins Hospital Reports VIII, 1899), Studies in relation to Malaria: The structure and biology of Anopheles (Journal of Hygiene, i-iii, 1901-03) with A. E. Shipley, The part played by Musca domestica and allied (non-biting) flies in the spread of infective diseases (Rept. to Local Gov't. Board of Public Health, &c., London n. s. no. 16, 1909) with F. B. Jepson, and Ticks, a monograph of the Ixodoidea, parts I and II, with Cecil Warburton, Cambridge, England, 1908, 1911. Many of his papers in this field appeared in *Parasitology*, a journal which he founded in 1908 and of which he was editor for twenty-five years.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or last year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the later within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Barnes, H. F.**—Recent advances in Science. Entomology. [Sci. Progr.] 32: 542-547. **Betrem, J. G.**—Modern Entomologisch Onderzoek. [Handel. Zev. Nederland.—Indisch Natuurw. Cong. Gehouden Bativia van 23-26 Oct. 1935] p. 539-549. **Carpenter, J.**—Daily fluctuations in insect populations in the prairie forest ecotone of No. Amer. [C. R. XII Congr. Internat. Zool.] 2: 969-980, ill. **Cowley, J.**—Quantitative methods of local entomofaunistic survey. [9] 71: 8-12. **Hayward, K. J.**—Further records of insect migration in the Argentine republic. [9] 71: 6-7. **Hincks, W. D.**—A plea for better citation of synonymy. [8] 74: 13-14. **d'Orchymont, A.**—Changements de noms de genres. L' "Opinion" 11. [33] 77: 423-432. **Schneider, H.**—Fangreisen in Uruguay. La Sierra de las Animas. [17] 55: 97-102; 109-112; 128-131, ill.

ANATOMY, PHYSIOLOGY, ETC.—**Albertson, G. W.**—A morphological study and comparison of the mouth parts of some Hymenoptera. [Contrib. Biol. Lab. Catholic Univ. Am.] 1921: 5-59, ill. **Anon.**—Chromosomes of Pyrgomorphinae. [Cur. Sci.] 6: 307. **Anon.**—The occurrence of v-shaped centrioles in the spermatocytes of some neuropteran insects. [Cur. Sci.] 6: 307. **Becker, E.**—Eine gut analysierbare pigmentablagerung in liesegangschen ringen bei insekten. [Forsch. und Fortsch.] 14: 9-11, ill. **Claus, A.**—Vergleichendphysiologische Untersuchungen zur Okologie

der Wasserwanzen mit besonderer Berichtigung der Brackwasserwanze. [89] (All. Zool.) 58: 365-432, ill. **Barth, R.**—Herkunft, Wirkung und Eigenschaften des weiblichen sexual duftstoffen einige Pyraliden. [89] (All. Zool.) 58: 297-329, ill. **v. Frankenberg, G.**—Die erste Fullung der Tracheen bei Culex und Corethra. [89] (All. Zool.) 58: 175-180, ill. **Ghidini, G. M.**—Le ghiandole della seta del Bombyx mori nel periodo maturativo e postmaturativo. [Bull. Zool., Italy] 8: 193-209. **Grandi, G.**—Morfologia ed etologia comparate di Insetti a regime specializzato. XII. Macrosiagon ferrugineum flabellatum. [Boll. Ist. Ent. Bologna] 9: 33-64, ill. **Guibe, J.**—Etude de l'aile chez Apterina pedestris (Sphaerocer.). [Bull. Soc. Z. France] 61: 266-273, ill. **Guye, C. E.**—Sur le bruit que produit un essaim d'insectes bourdonnants. [Arch. Sci. Phys. Nat.] 142: 53-70, ill. **Hebredey, K. F.**—Beitrag zum Bau des Subelytral raumes und zur Atmung der Coleopteren. [46] 33: 667-734, ill. **Henke, K.**—Versuch einer vergleichenden morphologie des flugelmusters der Saturniden auf entwicklungs-physiologischer grundlage. [Nova Acta Leopoldina.] 4 (18): 137 pp., ill. **Hilton, W. A.**—Nervous System and Sense Organs. LXV.—Isoptera. LXVI.—Mallophaga. LXVII.—Anoplura. LXVIII.—Corrodentia. LXIX.—Embidina. [13] 29: 88-99, ill. **Janda, V.**—Beitrage zur Kenntnis des Umfarbungsprozesses bei "Chrysopa vulgaris" (Neuropt.). [C. R. XII Congr. Internat. Zool.] 2: 1463-1471. **Johnson, M. W.**—A study of the nucleoli of certain insects and the crayfish. [Journ. Morph.] 62: 113-139, ill. **Kangas, E.**—Ein Fall von anomaler Fuhlerbildung bei Comber connata (Hymen., Tenthredin.) [Ann. Ent. Fenn.] 3: 150-153, ill. **Krey, J.**—Untersuchungen zur Okologie und Physiologie der Trichopterenlarven. II. Teil. Uber die Bedeutung der Wasser stoffionkonzentration fur die Physiologie von Trichopterenlarven verschiedener okologischer Valenz. [89] All. Zool.) 58: 201-224, ill. **Langner, E.**—Untersuchungen an Tegument und Epidermis bei Diplopoden. (Mit Beitragen zu Sehorganen und Hautdrusen). [89] Abt. (Anat) 63: 483-541, ill. **Lengerken, H. V.**—Studien uber die Lebenserscheingungen der Silphini (Coleo.). [46] 33: 654-666, ill. **Lison, L.**—L'appareil pulsatile du tube de malpighi chez Tenebrio molitor. [Soc. Roy. Zool. Belgique] 67: 41-49, ill. 1936. **Mahdihassan, S.**—Die Struktur des Stocklacks und der Bau der Lackzelle. [46] 33: 527-554, ill. **de Mello-Leitao, C.**—see under Arachnida. **Millot, J.**—Le sens du gout chez les Araignees. Metamerisation et

musculature abdominale chez les Araneomorphes. [Bull. Soc. Z. France] 61: 27-38; 181-204, ill. **Mosebach-Pukowski, E.**—Über die Raupengesellschaften von Vanessa io und V. urticae. [46] 33: 338-380, ill. **Muschamp, P. A. H.**—Gynandromorphism in Diptera [21] 50:2. **Naumann, F.**—Zur Reduktion der Saugrussels bei Lepidopteren und deren Beziehung zur Fluegelreduktion. [89] (Syst.) 70: 381-420, ill. **Park, T.**—A note on the size & composition of old Tribolium confusum populations. [90] 72: 24-33. **Poll, M.**—Note sur les tubes de Malpighi des larves de Tenthredinoides. [33] 77: 433-442, ill. **Rietschel, P.**—Bau und Funktion des Wehrstachels der Staatenbildenden Bienen und Wespen. [46] 33: 313-357, ill. **Scott, A. C.**—Paedogenesis in the Coleoptera. [46] 33: 633-653, ill. **Sen, Sirsir.**—On the mechanism of feeding in blood-sucking Acari, and its relationship with that of blood-sucking Diptera. [C. R. XII Congr. Internat. Zool.] 3:1584-1587, ill. **Sioli, H.**—Thermotaxis und Perzeption von Warmestrahlen bei der Bettwanze (Cimex lectularius). [89] (All. Zool.) 58: 284-296, ill. **Smith, S. G.**—Cytology of spruce sawfly and its control in eastern Canada. [31] 141:121. **Spotkov, E. M.**—The centriole in the parthenogenetic and fertilized eggs of Habrobracon juglandis. [Journ. Morph.] 62: 49-89, ill. **Stage, Gjullin & Yates.**—Flight range and longevity of flood-water mosquitoes in the lower Columbia River valley. [12] 30: 940-945, ill. **Svajkovskij, I.**—Aerodynamische eigentumlichkeiten der insekten. [Comptes Rendus Acad. Sci. U. S. S. R.] 17: 77-80, ill. **Tiensuu, L.**—Anomalous Mayfly Individuals (Ephemerida). [Ann. Ent. Fenn.] 3: 217-223, ill. **Vandel, A.**—L'evolution de la parthogenese naturelle. [C. R. XII Congr. Internat. Zool.] 1: 51-64. **Verhoeff, K. W.**—Die Perioden der Hautungs Zeit bei den Chilognathen. [46] 33: 438-444.

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130 pp. **Schenkling & Marshall.**—Coleopterorum Catalogus Pars 154. Curculionidae: Rhadinosominae, Trachodinae Raymondionyminae 1-4; 1-6. **Scott, A. C.**—(see under Anatomy). **Ting, P. C.**—A n. sp. of Dyslobus with notes on vestigial hind wings & genitalic characters in the Otiorhynchid weevils. [38] 36: 79-82, ill. **Uham, E.**—Ubersicht uber die ersten Gattungen der Uroplatini (Chrysomel.). [2] 33: 336-337, (Sk*). Amerikanische Hispinen aus dem Zool. Mus. Univ. Berlin. Subf. Amplipalpini. [Mitt. Zool. Mus. Berlin] 22: 198-213, ill. (S*). **Voss, E.**—Uber Arten und Gattungen der Unterfamilien Belinae, Rhynchitinae und Attelabinae (Curculion.). [60] 98: 199-209, ill., (S*). **Verhoeff, K. W.**—Zur biologie der Scutigera coleoptrata und uber die jungeren larvenstadien. [94] 150: 262-282, ill.

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SPECIAL NOTICES.—Die Palearktischen Colletes-arten.—J. Noskiewicz. Prace Nauk. Wydaw. Towarz. Nauko We Lwowie. 529 pp., ill.

GENETICS AND THE ORIGIN OF SPECIES. By THEODOSIUS DOBZHANSKY, Professor of Genetics, California Institute of Technology. Columbia University Press, New York, N. Y. pp. xvi + 364. 22 illus. $3.60.

This volume presents an astonishingly lucid account of those facts and theories of modern genetics that bear upon the mechanism of organic evolution. Gene mutations and the genetically and cytologically verifiable rearrangements occurring in the structure of the chromosomes are shown to supply the raw material for evolution. The study of these changes together with the study of the effects of geographical isolation and of natural selection appears to bring us much closer than we have ever been before to an understanding of the way in which evolution has come about. The statement frequently heard a few years ago, that genetics deals only with the inheritance of abnormalities occurring in laboratory animals can no longer be successfully defended. Much of the present volume deals with the genetical analysis of differences between various species and races of insects as they are found in nature, combined with careful studies of the geographical distribution of the forms involved. One cannot consider the facts here so clearly presented without feeling that genetics is making a real contribution to our understanding of the problem ot race and of species formation. At present the degree of difference recognizable in the structure of the chromosomes is not always correlated with the degree of differentiation in the systematic rank of the forms in question, nor can chromosome morphology or chromesome number be always so correlated. Nevertheless there is also so much information of a positive nature that there is at present a greatly improved outlook for the hope that "the tracing of phylogenetic relationships is to become at long last an exact procedure instead of the expression of the opinion of the particular investigator." To those interested in phylogenetic and in systematic studies this book will be of especial interest. Systematists have developed some fairly definite ideas regarding the evolution of races and species and regarding the rôle of isolation in effecting evolutionary differentiation. These ideas, which they have developed, often through a kind of intuitive understanding of their observations, are extensively confirmed and augmented by the rigorous analytic methods of genetics, albeit expressed in a different terminology and based largely on a different type of evidence. In addition, genetical theories offer a good explanation of the evolution of non-adaptive racial and specific characteristics, of those features so

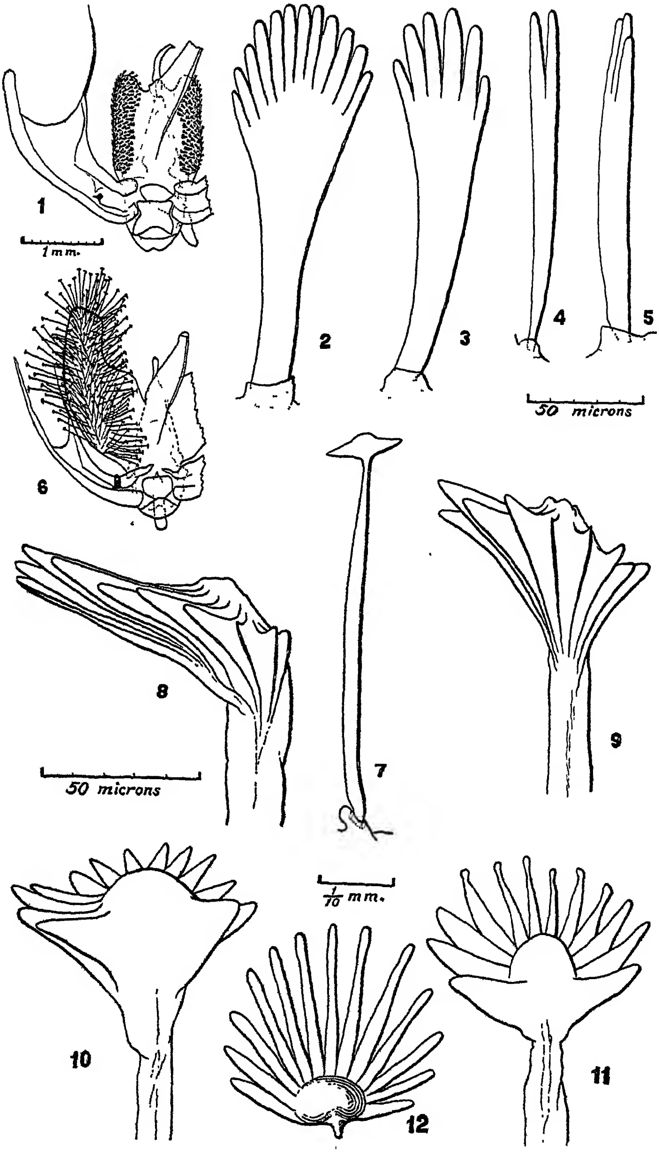
much used for diagnostic purposes in taxonomy but which have always been inexplicable on the basis of natural selection and which have always been an embarrassment to all good Darwinians.—R. G. SCHMIEDER.

SOURCE BOOK OF BIOLOGICAL TERMS. By AXEL L. MELANDER. The College of the City of New York, 160 pp. 8vo. 1937. $1.10.—This book well covers the ground suggested by its title. The author, introducing this book says: "One of the disciplines of the study of Biology is the acquaintance of a technical vocabulary. Each term incorrectly used becomes responsible for an ever widening circle of faulty repetition. The language of Biology seems strange to beginning students because most of the terms used are of Greek or Latin extraction but when such words are given a meaning the student realizes that nomenclature is a help and not a hindrance to his study." An idea of the ground covered in this book can be gleaned from a perusal of the table of its contents. Here we find chapters on biological nomenclature, the romance of taxonomic names, classical sources for names, evolution of word meanings; how words originate, their phylogeny, homologies and how they change in passing from one language to another; words of uncertain and mistaken derivations; how some words are derived from ancient customs, biological beliefs, divinations and early anatomical conceptions; words based on unnatural history, on color and terms relating to education. Further we have chapters on accentuation, pronunciation of taxonomic terms, mispronunciations, suffices, prefixes, plurals, the Greek alphabet, derivations of biological terms and lastly one on some pertinent definitions. All this we have in sixty-one pages. In part two of ninety-five pages is an alphabetical list of many components of biological vocabulary.—E. T. CRESSON, Jr.

PROCEDURE IN TAXONOMY. BY EDWARD T. SCHENK and JOHN H. MCMASTERS. Stanford University Press, 72 pages, 8 vo. Publication date, February 26, 1936. Price $2.00.—This book was prepared to supply the student as well as the professional systematist with the principles of taxonomy. The contents are grouped into chapters on systematic categories, types, descriptions of new species, specific names, synonyms, storage of type material, Latin names and abbreviations; with an appendix giving the rules and opinions of the International Commission on Zoological Nomenclature. The title "Procedure in Taxonomy", however, gives rather an erroneous im-

pression of what one would expect. One might say that Procedure in Paleontological Taxonomy would have been a better title, as palaeontology is its background, and many of the illustrations, forms and references savor of this science. However, judging from the poorly constructed descriptions and revisions one finds in the great mass of the literature of today, many students and authors of zoology will find very profitable reading in this little book. A commendable feature is the index to the rules and opinions of the zoological commission. This alone enhances its value to zoological taxonomists. The writer of this notice does not concur in many of the recommendations, and there are many to which others will take exception; but on the whole these are of rather minor importance as compared with the general commendations.—E. T. CRESSON, Jr.

THE MALE GENITALIA OF ORTHOPTEROID INSECTS. By R. E. SNODGRASS. Smithsonian Miscellaneous Publications, Vol. 96, No. 5. Pp. 1-107, 42 figs. Washington, September 25, 1937.—The Introduction, of 11 pages, begins: "The order Orthoptera . . . includes at least the Mantoidea, Blattoidea, Tettigonioidea and Acridioidea. The group unity of these forms is attested in the structure of the male reproductive system by the compounding of the so-called accessory genital glands that appear, in the adult condition, to arise from the inner end of the ductus ejaculatorius, but which in their development are outgrowths of the mesodernal coelomic ampullae into which the vasa deferentia discharge. Closely associated with the true Orthoptera by the same feature of the male genitalia are the Termitidae, Embiidae, Grylloblattidae, Phasmatidae and probably the Zorotypidae. On the other hand, the Plecoptera and the Dermaptera would appear to be distinct orders having no close relationship with the Orthoptera, since in each of these groups the male reproductive system is specialized in its own way, and shows none of the features characteristic of the orthopteroid insects." Following this is a summary of the development of the male gonads, based largely on Nelson's work on *Melanophus*, of the male genital ducts and of the external genitalia. Then nine sections are devoted to the Isoptera, Embioptera, Zoraptera, Grylloblattoidea, Phasmatoidea, Mantoidea, Blattoidea, Tettigonioidea and Acridoidea respectively, those on the Blattoidea (22 pp.) and the Tettigonioidea (38 pp.) being the most extensive. In each section the previous literature is summarized and original observations and illustrations by the author are added.—P. P. CALVERT.



SETAE OF MALE GENITALIA OF AMYNA—Richards.

ENTOMOLOGICAL NEWS

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The Remarkable Setae on the Male Genitalia of the North American Species of the Genus Amyna. (Lepidoptera: Noctuidae).

By A. GLENN RICHARDS, Jr., Biology Department, College of the City of New York.

(Plate I.)

The modified setae with which this paper is largely concerned are confined to the lateral lobes of the tegumen.[1] These lobes (figs. 1 and 6) arise from the entire lateral surface of the tegumen (ninth abdominal tergite) and extend from the base of the uncus (tenth abdominal tergite) to the ventral edge of the tegumen at the point of its articulation with the vinculum (coxosternal arc of ninth abdominal segment) and its appendage, the harpe. In *Amyna octo* they are relatively narrow (fig. 1) but in *A. bullula* they are greatly developed processes and appreciably larger than the harpes (fig. 6).[2]

The setae on the lateral lobes of the tegumen of *Amyna octo* are about 160-180 in number on each side but are so crowded and overlapping that a more accurate counting cannot be made readily. In shape they vary from nearly simple, albeit somewhat swollen and distally flattened forms (not illustrated), through apically bifurcated forms (fig. 4) to ones with numerous finger-like processes up to fourteen in number (figs. 2 and 3). In size these fimbriated setae vary in length from about 140-160mu from the setal socket to the distal end of the longest fimbriae; in breadth they vary from about 3-16mu at the socket to from about 7-60mu at the broadest point near the apex, the breadth being correlated with the number of fimbriae on the seta. The individual fimbriae vary considerably, being from about 3-8mu broad at the broadest point and about 15-40

[1] Many normal simple setae, long or short, are found on the harpes, especially on the apical part of sacculus, and on the uncus.

[2] A formal description of the general structure of the male genitalia is given near the end of this paper.

mu long. These fimbriated setae have the processes all in a single row (plane) across the apical end of the distally flattened seta (fig. 5) On the whole these forms are found scattered about on the lobes of the tegumen but there is a noticeable tendency for the ones with the fewer prongs to occur along the outer margin and the many-pronged ones to occur away from the margin.[3]

The setae on the lateral lobes of the tegumen of *Amyna bullula* can be counted with considerable accuracy due to the greater area concerned and to the distinctive apical modifications (except that a few setae are broken off from all mounts). The number present on each of four lobes (both sides of two specimens) varies from about 185 to 200—only slightly more than on the smaller lobes of *A. octo.* In size they are rather constant. They average slightly more than one-half a millimeter in overall length, about 14mu in breadth at the base, about 22mu in breadth at the greatest diameter at the center of the 'stalk', and then seem to contract to about 8mu just before the apical structure.[4] The apical structure has a maximum width of about 90mu across the longest flanges; the apical dome is about 20-30mu broad and 7-9mu high[4]; the flanges are in a graded series of lengths varying from about 15-50mu. In shape these setae seem to be fairly constant. They appear in profile as distinctly mushroom-shaped when viewed from 'front or rear' (fig. 7), or with varying degrees of asymmetry when viewed from the side or some other angle (figs. 8 and 9). These setae are made up of a long swollen basal stalk which seems to decrease in diameter distally[4], and which is crowned with an elaborate apical structure (figs. 7-12). This apical structure is composed of a central dome-like area of rather thin chitin which is usually quite rounded but sometimes somewhat

[3] Compare Pierce, 1914, figure of setae on ovipositor of female of *Theria rupicapraria*, and Ferris, 1934, fig. 2N (seta from coccid).

[4] The chitinous walls of the setae are more or less delicate in this area and frequently have a wrinkled appearance which may possibly indicate shrinkage or partial collapse either in drying or during the process of preparing the macerated mount from the dried specimens. The tendency of some flanges to appear thicker at their tips, and the variation and tendency towards ribbing of the apical dome may also possibly be due to such shrinkage.

wrinkled or angulate[4], and from which there radiate out on three sides from 12-14 triangular blunt-tipped flanges (figs. 8-12). Viewed 'from the side', the tip of one of these remarkable setae appears as a dome with long triangular flanges extending to one side and shorter flanges extending towards the observer (fig. 8). Viewed from more or less 'in front or rear' the setae seem to have varying degrees of asymmetry depending on the angle from which they are viewed (fig. 9). Viewed from a right angle to what I have called the 'side view' the setae may appear to be perfectly symmetrical (figs. 10-12). In other words, they are bilaterally symmetrical but not radially symmetrical. No perfect view straight down onto the tip of one of these setae was obtained but figure 12 approaches such rather closely and shows the relative lengths of the flanges more accurately than any of the other figures.

One naturally wonders what function these strange setae of *Amyna bullula* may have. Being a part of the male genital armature it is not unreasonable to assume some connection with copulation. They do not have the general external characteristics of scent-producing or scent-carrying setae (see papers by Eltringham and Snodgrass), and being so extravagant in structure one would like to think them more than mere tactile receptors. But with no knowledge of the nature of the cytoplasmic contents of the setae and no knowledge of the type of innervation it would be unwise to guess. Unfortunately, aside from its rarity, *Amyna bullula* is a rather small moth and the lobes bearing these setae are normally retracted into the end of the abdomen except during the act of copulation. It would seem no simple matter to study the function of these setae even if ample living material were available.

Only two species of the genus *Amyna* Guenée are found in North America north of Mexico.[5]. *A. octo* Guenée is of almost

[5] The genus *Amyna* Guenée is listed at present in the subfamily Erastriinae (Acontiinae), following Hampson (1910), but would seem better placed in the subfamily Acronyctinae (Apatelinae) despite the moderately well developed vein M_2 in the hind wing — or at least the two North American species seem acronyctine. I have already pointed out elsewhere that the North American species of *Amyna* have an unique development in the thoracic tympanum, and in that paper suggested that the genus might better be considered as an acronyctine (Richards, 1933).

cosmopolitan distribution. It is fairly common in the southern states and extends northward along the Atlantic coast to New Jersey. *A. bullula* Grote is a rare species recorded from Georgia to Texas and southward into Central America. The specimens of both species used in this study were collected by the author at light at Athens, Georgia, August to October, 1926-1929.

The male genitalia of *Amyna octo* and *bullula* (figs. 1 and 6) are symmetrical; uncus of moderate length, pointed and bearing a few simple setae; anal tube rather long and with a weak narrow subscaphium; tegumen with highly developed lobes[6] arising from the entire lateral margin and bearing specially modified setae (see above); vinculum narrow and rounded or slightly excavated at tip; juxta large; transtillae short and broad; harpes conspicuously divided into two parts: 1) a long sacculus which projects beyond the rest of the appendage and which is clothed, especially near the tip, with many long simple setae, and 2) an anterior margin (cucullus) terminating in a long simple seta; these two sclerotized parts of the harpe are connected by a rather broad area of membrane, near the basal part of which is located the small clasper; aedoeagus with spined vesica.

I have slides of the genitalia of representative species of the majority of the North American genera of Noctuidae, and so

Incidentally, certain North American species, placed in the Erastriinae by Hampson (1910), have already been moved to the Acronyctinae. His "*Amyna teratophora* H.-S.", "*Bryocodia lepidula* Grt.", and "*Bryocodia avirida* Sm." have all been placed in the acronyctine genus *Agriopodes* Hampson by Barnes and McDunnough (1917). I feel inclined to suggest for *Amyna octo* Guenée and *A. bullula* Grote a position somewhere in the neighborhood of *Cerma* Hübner or *Agriopodes* Hampson, although I realize the uncertainty of much of the generic grouping in the Acronyctinae and even of the separation of what I have called the Erastriini (Richards, 1933).

[6] These lobes are probably to be considered the peniculus of Pierce (1909), although in no other genus known to the present author do they arise from the *entire* lateral margin of the tegumen. Usually the peniculus arises from the ventral portion of the tegumen but in some noctuids (e. g. *Enargia decolor* Walker) a lobe, perhaps to be called a peniculus although it does not bear a dense tuft of setae, arises from the dorsal part of the tegumen. The situation is further complicated by the uncertainty as to the homology of the peniculus (a term used principally in the Noctuidae) with the outgrowths of the tegumen in other Lepidoptera, namely the socius and gnathos.

far as I know no other genus of American Noctuidae possesses such highly modified setae, either of these or of any other type. Certain groups do have heavy vestiture on moderate enlargements of the tegumen (peniculus of Pierce, 1909) but this vestiture in all other species of Noctuidae known to me and in all the species figured by Pierce (1909) consists of many long simple setae. 'Hair pencils' are frequently found on various parts of the body of Lepidoptera but the setae in such tufts are of relatively simple structure (see Eltringham, 1915-1933). Distally spatulate setae (clavate scales of Pierce, 1914) are found on various parts of the male genitalia of a number of species of Lepidoptera (Pierce, 1914; Richards 1936). Setae similar to those described herein for *Amyna octo* are found on certain coccids (Ferris, 1934) and on the ovipositor of the female of the geometrid moth *Theria rupicapraria* (Pierce, 1914). Nowhere have I seen reference to setae resembling the type found on the male genitalia of *Amyna bullula*.

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EXPLANATION OF PLATE I.

All drawings made by the author with a compound microscope and with the aid of a camera lucida. Dimensions indicated by scales drawn from a stage micrometer with the aid of a camera lucida and with the same lenses that were used in making the drawings.

Fig. 1. Small scale drawing of the male genitalia of *Amyna octo* Guenée showing the lateral lobes of the tegumen and the position of the modified setae thereon. Harpe omitted from one side.

Figs. 2-5. Enlarged drawings of single setae from the lateral lobes of the tegumen of *A. octo*. Figure 5 is a drawing of a view at almost a right angle from the views shown in figures 2-4. All four drawings at same magnification (scale drawn below figs. 4-5).

Fig. 6. Small scale drawing of the male genitalia of *Amyna bullula* Grote showing the lateral lobe of the tegumen and the position of the modified setae thereon. Setae not sketched individually with the camera lucida and so only approximately correct both as to number and position. Harpe and lobe of tegumen omitted from one side. Drawn at same magnification as figure 1.

Fig. 7. Enlarged outline drawing of a single seta from the lateral lobe of the tegumen of *A. bullula*. Scale of magnification drawn below.

Fig. 8. Greatly enlarged drawing of 'side view' of the apical structure of a setae from the lobe of the tegumen of *A. bullula*. Scale of magnification drawn below.

Fig. 9. Greatly enlarged drawing of a diagonal view of the apical structure of another seta from the lobe of the tegumen of *A. bullula*. Magnification same as figure 8.

Fig. 10. Same, but looking slightly down on the apical structure and from the 'rear side'. Magnification same as figure 8.

Fig. 11. Same, but looking down on the apical structure from a greater angle.

Fig. 12. Same, but looking almost directly down on the apical structure.

Where and When to find the Orthoptera of Pennsylvania, With Notes on the Species Which In Distribution Reach Nearest This State.

By MORGAN HEBARD, Philadelphia, Pennsylvania.

(Continued from page 39.)

CONOCEPHALUS NIGROPLEURUM (Bruner). May be present locally throughout the northwest portion of the State, but is known only from Milton, Pennsylvania, a southeastern limit. Ithaca, New York is a northeastern limit. Inhabits grasses and sedges in humid spots. Appears adult in early July.

C. ATTENUATUS (Scudder). A central western species probably present locally throughout Pennsylvania excepting all high areas in the mountains and the northeastern portion of the State. Eastern limits are Ithaca, New York; Sussex and Rancocas, New Jersey, and New Castle, Delaware. I have material from Cornwells and Harrisburg, Pennsylvania. Local but abundant when found in tall vegetation near water. Appears adult in early August.

C. SALTANS (Scudder). Should be present locally throughout the lowlands of all but northern Pennsylvania. Yet known only from Fern Hill in Chester County. Found in grasses on dry poor soil or sandy areas. Appears adult in early August.

DECTICINAE.

ATLANTICUS TESTACEUS (Scudder). Present but very local, occasionally probably moderately numerous, throughout Pennsylvania. In dead leaves and undergrowth of scattered deciduous forests, particularly of oak. Appears adult in early June.

A. DAVISI Rehn and Hebard. Present throughout the mountains of Pennsylvania. Local but often numerous. In similar environment. Appears adult in early June.

A. AMERICANUS AMERICANUS (Saussure). A more austral species than the preceding, probably very locally distributed in the eastern lowlands and eastern mountains of Pennsylvania and has as yet been taken only at Pink Hill in Delaware County in open woods on a serpentine outcrop. Appears adult early in July.

GRYLLACRIDIDAE.

GRYLLACRINAE.

CAMPTONOTUS CAROLINENSIS (Gerstaecker). Probably confined to the lowlands of southeastern Pennsylvania, a specimen from Dresher constituting a northern limit. Local and very seldom seen in shrubbery and vine tangles. A comparatively rare nocturnal insect. Appears adult early in August.

RHAPHIDOPHORINAE.

The introduced *Tachycines asynamorus* Adelung will probably be found in greenhouses and cellars in Pennsylvania, as it is now widely distributed and established in such artificial environment in the United States.

HADENOECUS PUTEANUS Scudder. Generally distributed in the South Mountain hills and the mountains of Pennsylvania as far north as Allentown and Center County (material before me) and east and south to Allentown, near Reading (material before me) and Rockville. Widespread southward through the Appalachian Mountains. Lives in rock piles, holes in the ground, wells and caves. Appears adult in mid-July.

CEUTHOPHILUS BREVIPES Scudder. A widespread and common boreal species present through all of Pennsylvania except the eastern lowlands. Spruce Cabin Falls and Blue Ridge Summit are southeastern limits. Six records from the State. Adults are present in the Spring, but majority here taken in August.

C. GRACILIPES GRACILIPES (Haldeman). An Appalachian species occuring throughout the forests and caves of the mountains of Pennsylvania and absent from the eastern and northwestern lowlands. Very common. Eleven records from State. Lehigh Gap and Blue Ridge Summit are southeastern limits. Adults appear late in May, many here taken in August.

C. MERIDIONALIS Scudder. A relatively scarcer mid-western species known in the East only from eight localities in the lowlands of the eastern portion of Pennsylvania, northern limits being Dark Hollow, Lebanon and Harrisburg. Prefers low moist forests. Adults appear early in Summer and are most numerous in the Fall.

C. PALLIDIPES E. M. Walker. A common boreal and Appalachian species, probably occurring throughout Pennsylvania. Prefers mixed and deciduous forests. Fifteen records for the State with Whitemarsh a southeastern limit. Adults appear early in Summer and are most numerous in the Fall.

C. LATENS Scudder. A moderately common species present throughout the decidous forests of southern Pennsylvania except at high elevations and occurring up the Susquehanna River to Orangeville. Six records from State. Adults appear in early June, are more numerous in the Summer and some survive to late Fall.

C. MACULATUS (Harris). A relatively scarcer boreal species possibly present in all but southwestern Pennsylvania. Material is before me from Hess Cave near Reading. Previously doubtfully recorded only from Chestnut Hill and Rockville. Present adult through the year, the majority in July and August.

C. UHLERI Scudder. An exceedingly common south-central and Appalachian species, present only in southeastern Pennsylvania, northwestern limits being Lehigh Gap and Rockville. Known from nine localities, the majority about Philadelphia. Appears adult in June but the majority present in late Fall.

C. LAPIDICOLA (Burmeister). A south Appalachian woodland species present in the lowlands of southeastern Pennsylvania north to Monocacy, Lebanon and Dauphin. Relatively scarce but was found at Whitemarsh in very great numbers. Twelve localities for State. Present adult throughout the year, the majority from June to August.

C. DIVERGENS Scudder. Known from southeastern Pennsylvania this common species probably also occurs at low elevations in the intervening territory. Very generally distributed but particularly fond of forests in mesic environment. Eight records for the State. Appears adult in early June, the majority in July and August.

C. NIGRICANS Scudder. All of Pennsylvania included in its distribution but not yet recorded from the northwestern section. A moderately common insect generally present in forests. Nineteen records from the State. Adults present throughout the year, majority probably from June to December.

GRYLLIDAE.

GRYLLINAE.

GRYLLULUS ASSIMILIS (Fabricius). Present throughout Pennsylvania and often very abundant particularly in grassland. Broods appear adult the middle of May, in the Summer and in the Fall.

G. DOMESTICUS (Linnaeus). Introduced and now established. Material before me from Philadelphia, West Philadelphia and Upper Darby. Rarely seen but sometimes very numerous when found. Possibly adult throughout the year.

MIOGRYLLUS VERTICALIS (Serville). Probably present through southern Pennsylvania but very local and not abundant. Lives in fields and moist spots in burrows, under the grasses, boards, etc., and so is comparatively rarely seen. Probably feeds at night more than during the day. Appears adult in late May. I have material from Philadelphia, Villanova and near Lancaster.

NEMOBIINAE.

NEMOBIUS FASCIATUS FASCIATUS (DeGeer). Everywhere except in heavy forests in Pennsylvania. Extremely abundant. Appears adult in early July.

N. FASCIATUS TINNULUS Fulton. Local, usually in large colonies in forest undergrowth. I have material from North as far as Stroudsburg and Diamond Valley in Huntingdon County. Represents rather an environmental development than the usual concept of a race. Appears adult in early August.

N. MACULATUS Blatchley. Local but usually in large colonies in forest undergrowth. Probably absent from boreal portions of Pennsylvania and as yet known only from Cornwells, Chestnut Hill and Camphill in Dauphin County. Appears adult in early August.

N. CUBENSIS PALUSTRIS Blatchley. Should be found in sphagnum bogs very locally in Pennsylvania, but is only represented by material from Tinicum Island, Villanova and Stroudsburg. Usually numerous when found but both difficult to locate and to capture. Appears adult in mid-August.

N. BRUNERI Hebard. Confined to extreme southeastern

Pennsylvania where at Cornwells one large colony was located among dead leaves on the sandy shore of the Delaware River. Cornwells is a northeastern limit. Appears adult in early August.

N. CAROLINUS CAROLINUS Scudder. Probably throughout Pennsylvania in dead leaves and undergrowth along fence rows and woodlands and also in open woods. Appears adult early in July.

OECANTHINAE.

OECANTHUS EXCLAMATIONIS Davis. Probably throughout Pennsylvania except in the most boreal areas. Rarely seen and apparently more definitely arboreal than any of the other species of the genus. Prefers oaks, maples and other deciduous trees. Can be considered one of the scarcer crickets. Appears adult in late July.

OE. ANGUSTIPENNIS Fitch. Probably generally distributed through Pennsylvania but may be absent from the more boreal portions. Prefers shrubbery and is often present locally in very large colonies. Appears adult in mid-August, greatest abundance in late Fall.

OE. NIVEUS (DeGeer). Much the same distribution but usually decidedly less abundant and often found singly. Prefers vines, apple trees and bushes. Appears adult in mid-July.

OE. NIGRICORNIS QUADRIPUNCTATUS Beutenmuller. Very abundant and generally distributed in weeds in open throughout Pennsylvania. Rather an adaptation to certain types of vegetation; limited to a definite area of distribution which however is largely coincident with that of *nigricornis nigricornis*. Appears adult in mid-July.

OE. NIGRICORNIS NIGRICORNIS F. Walker. Locally abundant in raspberry vines (typical), shrubs and tall herbs in open throughout Pennsylvania. Appears adult in early August. A decidedly atypic condition is very abundant in the high weeds of the marshes along the Delaware River in southeastern Pennsylvania.

OE. PINI Beutenmuller. Arboreal, inhabiting only pine trees in dry sandy areas (Pitch Pine and Scrub Pine, *Pinus rigida*

and *Pinus virginiana*). Possibly present in such areas throughout all but the most boreal portions of Pennsylvania, but the only valid record is Bloomsburg[12]. Northern limits are Gloucester, Massachusetts; Windham, Connecticut; Karner, New York, and Columbiana and Erie Counties, Ohio (E. S. Thomas), while a southern limit is Raleigh, North Carolina. Though rare in collections, individuals are sometimes to be found in large scattered colonies. Appears adult in late July.

OE. LATIPENNIS Riley. Present in the lowlands of southern Pennsylvania; northern limits are the vicinity of Philadelphia and Allegheny County. Occasional in decidious woodlands, on oaks, but also on shrubs and vines. Appears adult in mid-August.

NEOXABEA BIPUNCTATA (DeGeer). Probably absent from the boreal portions of Pennsylvania, this insect should be sought in all other sections. Known from a number of localities in the southeastern area and Jeannette in Allegheny County. Scarce, secretive and very local, often found singly. Prefers vine tangles in openings of woodlands and along forest borders. Appears adult in early August.

TRIGONIDIINAE.

ANAXIPHA EXIGUA (Say). Known north as far as Morrisville and Chestnut Hill in southeastern Pennsylvania, but the species is probably present throughout the lowlands of the State. Local but often moderately abundant when located. Prefers high weeds, grasses and bushes in wet areas and near water. Appears adult in late July.

PHYLLOPALPUS PULCHELLUS Uhler. I have material only from Tinicum Island and the species may be limited to southeastern Pennsylvania. It is decidedly scarce there and very local, in high weedy growth along ditch borders in Delaware River marshes. Appears adult in late July (July 25, 1937, H. R. Roberts).

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[12] The atypic condition of *nigricornis nigricornis* discussed above has been incorrectly recorded as *pini* from Delaware County (based on material from Tinicum Island which Rehn and Hebard collected) by Blatchley in 1920.

ENEOPTERINAE.

HAPITHUS AGITATOR AGITATOR Uhler. Probably limited to southeastern Pennsylvania, where it occurs very locally in moderate numbers in the tall weedy growth of the Delaware River shores and marshes. I have it from Cornwells and Tinicum Island, but it is known up the river as far as Burlington, New Jersey. Should be sought also in shrubbery in damp woodland environment. Appears adult in early August.

OROCHARIS SALTATOR Uhler. Possibly limited to southeastern Pennsylvania. There present but very rarely seen in shrubbery and vines particularly near woodlands. Decidedly a rare species in this State. I have material from Cornwells, Philadelphia and Chestnut Hill. Appears adult early in August.

GRYLLOTALPINAE.

GRYLLOTALPA HEXADACTYLA Perty. Lives in burrows in the moist earth along streams or around ponds. Nocturnal and largely subterranean. Local and rarely seen. Probably occurs throughout Pennsylvania, but known only from a number of localities about Philadelphia and Harrisburg (north to Newport). Present adult from early Spring to late Fall.

TRIDACTYLINAE.

TRIDACTYLUS APICIALIS Say. Probably throughout Pennsylvania except in the most boreal areas but there local, usually very scarce and rarely abundant. Prefers bare sand areas near water where it burrows but is on the surface much of the time. Known only from Harrisburg, V, 24, 1909, (Kirk and Champlain) and New Cumberland, V, 15, 1909, (Fox in litt.). Appears adult in September and so persists through the Winter and the following Spring.

T. MINUTUS Scudder. Present only in the warmer portions of Pennsylvania, Chestnut Hill and Port Treverton (material examined) are northern limits. Extremely local but when found usually in great numbers. Lives on bare sand areas near water. Period of adult appearance the same as for *apicialis*.

(To be continued.)

Two Unusual Collecting Records for Pennsylvania (Coleoptera: Scarabaeidae).

On November 6, 1937, while gunning in an open woods near Broomall in Delaware County, I found a nest of a white-footed mouse, beneath a piece of tin on the ground. In scratching around in the nest I found one specimen of *Aphodius leptotarsis Br*. To my knowledge the group of *Aphodius* (Platyderides Br.) to which this species belongs has heretofor been

strictly western, not being found east of the Mississippi River. Mr. W. J. Brown has kindly examined the specimen for me and writes that this is the only specimen he has seen except the two types, which were found in North West Territories and Riley County, Kansas.

Six specimens of Ochodaeus *musculus* (Say) were taken by the writer on June 19, 1937, in a heavy deciduous forest on the grounds of the Westtown School near West Chester. These specimens were collected along with *Odontaeus liebecki* Wallis by scratching away the surface of the leaf mold. This genus has not been recorded in Pennsylvania before, being southern and western in its distribution.—Mark Robinson, 1533 So. 56 St., Philadelphia, Pennsylvania.

The Mating of Ephestia kuehniella Zeller and its Results.[1]

By Joseph L. Williams, University of Pennsylvania and Lincoln University, Pennsylvania.

(Plates II and III.)

Introduction.

The contents of this paper grew out of a desire to verify, in other Lepidoptera, Arnold Pictet's observations of double copulation in *Lasiocampa quercus*. The following is a translated quotation from his observations: Normally the *Lasiocampa quercus* male copulates two successive times with the same female, once by placing himself on her left, then, after being detached from her and after being slightly distant from her for about twenty minutes, a second time by placing himself on her right. In both cases, the penetration of the penis was verified.

His conclusions are as follows:

(1). Only copulation on the left has the power of fertilizing.

(2). Copulation on the right has no other purpose except causing the laying of the eggs fertilized by the union on the left.

(3). The beginning of the laying immediately follows the union on the right. When this has been experimentally suppressed by the removal of the male, the female waits five or six

[1] A Thesis in Zoology presented to the Faculty of the Graduate School of the University of Pennsylvania in partial fulfillment of the requirements for the degree of Master of Arts.

days before beginning the act of laying; however, the eggs are fertilized.

(4). A male which has fertilized a first female can copulate with a second, but no longer has the power of fertilizing her, because he copulates with the second only on the right, and because only the union on the left has the power of fertilizing. The female lays immediately, but her eggs, it is agreed, are not fertilized.

(5). In the case where a second virgin male comes to pair with a female having already received a visit of a first male, during the interruption of egg laying, it is demonstrated that in spite of his virginity, this second male does not fertilize the mass of eggs remaining to be deposited because he only causes the emitting of the eggs fertilized by the first male. Moreover, in this case, the second male does not unite on the left, (coitus through which fertilization took place by the first), but only the right, (coitus which forces the laying). The habit of the species being to practise coitus twice, he copulates a second time, again on the right, which has for the purpose of forcing a third supplementary laying which is not fertilized.

(6). An anatomical study of the constitution of the female reproductive organs makes it obvious that the first coitus, on the left, (fertilization), would be made by the vaginal orifice which is situated to the left of the end of the abdomen, and that the second coitus, to the right, (acceleration of the egg-laying), would take place through the egg-laying orifice, situated on the right on the preceding, and whose sphincter it would dilate. In the case where the union to the right did not take place, (the beginning of the egg-laying being retarded), it is the time of waiting which, because of muscular relaxation, seems to take the place of the effect of the second coitus.

I observed sulphur butterflies in the field but was unable to see the details of the copulatory act. I caged a number of them but they did not copulate in captivity. I raised cabbage butterflies from larvae, but for some reason that particular group did not copulate.

One morning while out in the field I came upon a male and female *Telea polyphemus* lying on the ground together. The penis, at the time I came upon them, was thrust into the bursal opening of the female. I carefully caged the pair and later they broke apart. I brought them home to see if they would copulate again, but no further copulation took place. Later that night, I separated the male from the female and found the

next morning a great number of eggs in the female's cage. I placed the male back with the female but they did not copulate. Later that afternoon, the male died.

The second night, the female laid the greatest number of her eggs; and on the third night she laid a few. By this time, the abdomen which was at first enlarged, had become more slender than the thorax. The eggs were stuck neatly to the wire cage and two days after her last laying she died. Every egg hatched and I was able to raise twenty-six pupae out of this lot, by feeding the larvae on red oak leaves. Although I did not observe these moths from the beginning of copulation, the presence of the penis in the bursal opening suggests a fertilization copulation. Therefore *polyphemus* female does not need a separate copulation to make her lay. Since the first laying took place late that night, hours after I captured the moths, it would seem that waiting was the necessary stimulus for the dilation of the vaginal sphincter.

Later, in the summer of 1936, I took a genetics course, at the University of Pennsylvania under Dr. P. W. Whiting. He uses the wasp, *Habrobracon juglandis,* which is parasitic upon the larva of the moth *Ephestia kuehniella* Zeller. Whenever I would go to the stock boxes to get caterpillars, I would see moths fastened together. I began to study them, since there was a wealth of material available. I have observed hundreds of these moths copulating, and the penis was always found in the bursal opening. The vagina opens into a chitinous ovipositor, but I have never seen the penis in its opening. I have observed females lay fertilized eggs after a copulation only in the bursal opening, and females to lay with dead males hanging to them. Whenever the dead male was fastened to a female, the penis was in the opening of the bursa. I have seen dead females fastened to males and the penis was in the opening of the bursa. I have observed virgin females to lay unfertilized eggs, although the number was small. These observations suggest that the purpose of the bursal copulation is fertilization of the female and cause her to lay a great number of eggs; however, she can lay without copulating with the male, but the number of eggs laid is small.

I dissected a great number of these moths, (more than three hundred), and it was from my dissections that I learned the nature of some of the female organs before and after copulation.

Mating.

When a female is ready to mate, she lies quietly with her abdomen curved upward. The wings are spread apart a little and she keeps this position until mating occurs. If she be disturbed, she will crawl around just as any other female that is not ready to mate. Soon she becomes quiet again, spreads the wings and curves the abdomen upward, waiting for a male.

After mating the female lies quietly for a while, after which she begins to lay her eggs. Active egg-laying continues for about a day, after which she lies quietly, curves her abdomen upward with the wings spread, waiting to mate the second time. After this mating she lies quietly for a while as before, then begins to lay her eggs for another day. I have watched females mate three times. They will mate with the same male or any other male that comes to them.

A male that is ready to mate crawls around vibrating the wings. If he meets a female that is ready to mate, he turns the hind end of his abdomen to the hind end of the female's abdomen, and with the aid of his claspers, the penis is thrust into the bursal opening. The mating period varies from three to five hours. I have seen exceptional cases where the pair stayed together for more than twelve hours. Sometimes the pair is unable to break apart. In such cases the female lays her eggs with the male hanging to her. Under such conditions, one of the pair lives and the other dies. If the female lives, she is, of course, unable to mate with another male. On the average, males do not mate more than twice and after this they die. They live longer if they do not mate. I have been able to keep these moths alive for more than ten days by feeding them sugar or honey water; but their vitality seems to lessen with age. I have tried mating old males that had previously mated with females seeking to mate, but had very little success; greater success was obtained when young males were used.

(To be continued.)

Descriptions of New Melanic Forms (Lepidoptera: Geometridae, Noctuidae and Arctiidae).

By J. G. FRANCLEMONT, Ithaca, New York.

During the past three or four years of collecting numerous melanic forms of various species of moths have been caught, and since some of them have proved to be new, it seems fitting at this time to describe them. I believe that I am justified in doing so on three counts: the moths are very distinct in coloration, melanism is an inheritable characteristic, and numerous people before me have described similar forms of other species—some thinking they represented good species and others realizing that they were merely forms.

GEOMETRIDAE.

VENUSIA COMPTARIA form. nov. **palumbes.**

The fore and hind wings a uniform dark pearly gray, crossed by a blackish median line, all other lines obsolete, a few white streaks on the veins. especially the cubital and anal veins. Thorax and abdomen darker than the wings.

Holytype: ♀, Ithaca, NEW YORK, May 8, 1936 (J. G. Franclemont), [in Coll. Franclemont].

The uniformity in color will serve to distinguish this dark form from the normal form which is very pale and contrastily marked.

PHIGALIA TITEA form. nov. **deplorans.**

The fore and hind wings a uniform powdery black, the fore wings with the post-medial, median and antemedial lines faintly discernible, the subterminal line white but quite faint; the hind wings with a very faint postmedial line, not evident in some specimens. The thorax concolorous with the wings; abdomen darker contrasting with the wings and thorax.

Holytype: ♂, Ithaca, NEW YORK, April 26, 1935 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes:* 3 ♂ ♂, Ithaca, N. Y., April 27, 1935, May 1, 1937, March 22, 1938, (J. G. Franclemont), [in Coll. Franclemont].

This form may be readily distinguished from the typical form by its powdery black coloring and almost obsolete lines, the coloring of the normal form being pale whitish gray with very conspicuous black lines.

VITRINELLA PAMPINARIA form. nov. **stygia.**

The fore and hind wings deep grayish black, the ante- and postmedial lines black, but not conspicuous, a dark median shade on the fore wings, both fore and hind wings with a white subterminal line. The thorax and abdomen concolorous with the wings.

Holytype: ♂, Ithaca, NEW YORK, Aug. 13, 1937 (J. G. Franclemont), [in Coll. Franclemont].

This form differs from the normal form in its almost uniform black color, that of the normal being gray.

NOCTUIDAE.

CATOCALA CEROGAMA form. nov. **ruperti.**

Head black with the bases of the antennae white; thorax black with the collar and tegulae edged with white, the posterior tuft white, the legs with the femora, tibiae and tarsi black on their outer side and white on their inner side. Fore wings shining black with a slight brownish cast in some lights, the subterminal line white, the most conspicuous feature of the fore wings, the postmedial line evident, of intenser black, edged on the outer side by a pale shade, antemedial line indistinct, subreniform pale contrasting with the ground color, reniform very faintly indicated, the fringe black. Hind wings black, paler at base, crossed by a single median yellow band, somewhat reduced compared with that of normal *cerogama,* especially the last third which tends to become obsolete in some specimens, the fringe white. Underside of fore wings black crossed by cream colored postmedial and antemedial bands, underside of hind wings black with the median band and base cream colored tinted with yellow.

Holotype: ♂, Ithaca, NEW YORK, Aug. 20, 1937 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype:* ♀, Ithaca, N. Y., Aug. 16, 1937 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes:* 16 ♂, 21 ♀, Ithaca, N. Y., July 4 to Sept. 12, 1935 to 1937, (J. G. Franclemont, H. I. Scudder), [in Coll. Franclemont, Lemmer, Rupert and Cornell Univ.]. 4 ♂, 1 ♀; Sardinia, N. Y., Aug. 18 to 30, 1937 (L. R. Rupert), [in Coll. Rupert].

This very conspicuous form can be readily separated from the normal form of *cerogama* by its totally black forewings and by the usual reduction of the yellow band of the hind wings.

I consider this form the showiest *Catocala* we have about

Ithaca, and I look on its gradual increase from year to year with interest. I take great pleasure in naming this form for my friend, Mr. Laurence R. Rupert, who shared with me the pleasure of catching the first specimens.

CATOCALA MESKEI form. nov. **krombeini.**

Head black, bases of the antennae white; thorax black dusted with white, tegulae whitish in central portion, appearing as if margined with black; abdomen grayish brown with a blackish cast. Fore wings powdery black, the margin pale with the veins black in this area, subterminal line white, very conspicuous the postmedial line traceable towards the costal margin, other lines obsolete, the subreniform pale connecting with a whitish patch before the reniform which is barely evident, fringe pale; hindwings as in normal *meskei*. Underside of fore wings black, base pale, and antemedial triangular patch of white and a postmedial band of white narrowing toward inner margin; underside of hindwings flushed with red, a black medium band and a broad black marginal band, fringe white.

Holotype: ♀, Ithaca, NEW YORK, July 23, 1937 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype:* ♂, Ithaca, N. Y., Aug. 5, 1937 (J. G. Franclemont), [in Coll. Franclemont.] *Paratypes:* All Ithaca, N. Y., 1 ♀, July 19, 1937, 1 ♀, July 23, 1937, 1 ♀, July 31, 1937 (J. G. Franclemont), [all in Coll. Franclemont].

Typical *C. meskei* is not considered a common species and it was a surprise to find it at Ithaca this past summer, but more of a surprise was the melanic form. At first I thought it might be nothing more than aberrant *C. briseis*. It differs from typical *meskei* in the black fore wings and may be distinguished from *briseis* by the narrower and more pointed fore wings and the lack of the buff shade between the white subterminal line and the black postmedial line.

This form is named for my friend Mr. Karl V. Krombein, the companion on many collecting excursions.

CATOCALA PARTA form. nov. **forbesi.**

Head and palpi black, bases of the antennae white; thorax brownish gray with the collar and tegulae edged with black; abdomen brownish black. Fore wings intense black with a few brownish shades, subterminal line white, postmedial line intenser black, made evident by a pale shade on its outer side, white at inner margin, antemedial line blackish buff, white at

inner margin, subreniform pale with a black center, reniform traceable, fringe pale; hind wings as in normal *parta,* fringe white; underside of forewings black, with the base white and the two cross bands white; underside of hind wings flushed with red, crossed by a median black band and a wide, black, marginal band.

Holotype: ♀, Sardinia, NEW YORK, Aug. 7, 1934 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype:* ♂, Sardinia, N. Y., Aug. 28, 1937 (L. R. Rupert), [in Coll. Franclemont]. *Paratypes:* Sardinia, N. Y., 1 ♂, July 30, 1934, 1 ♀, Aug. 27, 1937 (L. R. Rupert), [in Coll. Rupert].

This very striking form may be distinguished from the normal form of *parta,* which is soft gray with a few brownish tints, by the almost uniform black coloring of the forewing; the black transverse streak running from the upper angle of the fore wing to the base, so conspicuous in normal *parta,* is completely obscured by the black ground color in this form.

I take pleasure in naming this form for Dr. W. T. M. Forbes, who has done much to "aid and abet" my interest in the Lepidoptera.

CATOCALA NEOGAMA form. nov. **mildredae.**

Head whitish gray, bases of the antennae black, thorax whitish gray, collar and tegulae edged with black, posterior tuft white; abdomen brownish black. Fore wings shining black with bluish or greenish reflections in some lights, brownish shades before the intense black postmedial line, antemedial line intense black becoming white at inner margin, subreniform pale, reniform warm brown, fringe dark; hind wings predominately black, the remaining yellow confined to two spots in the middle of the wings, one on the inner side and the other on the outer side of the median black band; the amount of yellow on the hind wings no doubt will vary with the individual specimens as it does in *cerogama;* fringe buff. Underside of fore wings black, yellow at base and crossed by antemedial and postmedial yellow bands; underside of hind wings black, base yellow and crossed by a yellow median band.

Holotype: ♀, Ithaca, NEW YORK, Aug. 25, 1937 (J. G. Franclemont), [in Coll. Franclemont].

This very handsome moth is a great contrast to the somber colored normal form of *neogama;* its black forewing with the glowing reflections of green and blue will serve to differentiate

it immediately from the normal form with its gray forewings. The amount of black on the hind wings, as noted in the above description, will probably vary from specimen to specimen.

I am pleased to name this beautiful form for my Mother.

ACRONICTA VINNULA form. nov. **percolens.**

Forewings deep olive green, black lines and dashes as in normal *vinnula,* the black postmedial line followed by a series of white lunules, a conspicuous feature of the wing; hind wings blackish gray. Thorax concolorous with the wings, collar and tegulae tipped with white; abdomen smoky gray.

Holotype: ♂, Ithaca, NEW YORK, July 5, 1937 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype:* ♀ Ithaca, N. Y., June 7, 1936 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes:* All Ithaca, N. Y., 1 ♂, June 2, 1933, 1 ♂, Aug. 5, 1937, 3 ♀, June 7, and Aug. 18, 1937 (J. G. Franclemont), [in Coll. Franclemont].

This pretty little form may be easily recognized by its intense olive color in comparison with the pale whitish gray color of the normal form.

ACRONICTA FRAGILIS form. nov. **atrior.**

Fore wings intense black with a white postmedial line, most noticeable in the females, the males tend to have almost uniform black forewings; hind wings dusky with a darker border. Thorax black; abdomen smoky gray with the basal tuft black.

Holotype: ♂, Ithaca, NEW YORK, May 25, 1936 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype:* ♀, Ithaca, N. Y., June 3, 1936 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes:* All Ithaca, N. Y. 1936, 1 ♂ 1 ♀, June 9, 1 ♂, June 12, (J. G. Franclemont), [in Coll. Franclemont].

The intense black forewings of this form distinguish it from the normal gray form of the species. This black form is much commoner than the normal form at Ithaca.

ACRONICTA SUPERANS form. nov. **superba.**

Fore wings blackish gray, with deep black shades and ordinary lines visible, the two whitish areas so conspicuous in normal *superans* reduced to dusky blackish shaded areas; hind wings blackish gray, paler at bases. Thorax yellowish gray dusted with black, collar edged with black, tegulae black with a few whitish flecks.

Holotype: ♂, Ithaca, N. Y., May 18, 1936 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype:* ♀, Sardinia, N. Y., June 20, 1934 (J. G. Franclemont), [in Coll. Franclemont].

This form has the forewings almost uniform in darkness of color in contrast to the varigated fore wings of the normal form.

ACRONICTA MORULA form. nov. **columboides.**

Fore wings a deep smoky gray, soft and somewhat olive in hue, with brownish shades, the ordinary lines and dashes as in normal *morula,* an indication of a subterminal row of pale dots and the postmedial line followed by a series of pale lunules; hind wings blackish gray. Thorax concolorous with fore wings, central portion brown; abdomen smoky gray.

Holotype: ♂, Chaffee, NEW YORK, May 14, 1934 [Bred], (J. G. Franclemont), [in Coll. Franclemont]. *Allotype:* ♀, Ithaca, N. Y., July 19, 1937 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes:* all New York, Crystal Lake, Cattaraugus County, 1 ♂, July 19, 1932; Sardinia, 1 ♂, June 20, 1934; Chaffee, 1 ♂, June 23, 1934; Ithaca, ♂, June 3, 1936, 3 ♂, 3 ♀, July 7, to 22, 1937, (J. G. Franclemont), [all in Coll. Franclemont].

This form will be readily recognized by its dark coloring as compared with the pale whitish gray coloring of the normal form.

ACRONICTA DISTANS form. nov. **scintillans.**

Fore wings shining gray black with a slight tendency to appear powdery, a series of subterminal whitish spots, ordinary lines and spots present of intenser black than the ground color; hind wings blackish gray, paler at base, females with hind wings all black. Thorax black contrasting somewhat, but not noticeably with the fore wings; abdomen dark luteous black.

Holotype: ♂, Crystal Lake, Cattaraugus County, NEW YORK, Aug. 2, 1933 (J. G. Franclemont), [in Coll. Franclemont] *Allotype:* ♀, Chaffee, N. Y., Aug. 3. 1934 (J. G. Franclemont), [in Coll. Franclemont] *Paratypes:* Chaffee, N. Y., 2 ♂, July 17, and 31, 1934; Crystal Lake, Catt. Co., N. Y., 1 ♀, July 28, 1933; Ithaca, N. Y., 1 ♂, May 12, 1936, 1 ♀, July 22 and 1 ♂, Aug 5, 1937 (J. G. Franclemont), [in Coll. Franclemont].

The deep shining black color of the fore wings will readily aid in distinguishing this form from the normal gray form. It is not as common as the dark form of *impleta*, but appears to be more widely distributed.

ARCTIIDAE.

HAPLOA CONFUSA form. nov. **suffusca.**

Forewings with the ground color dark fuscous, the ordinary markings of the species not contrasting to any great degree with the ground color, but nevertheless evident because of the relatively darker color; hind wings pale fuscous, lighter at base; thorax fuscous, tegulate white; abdomen dusky with a dark dorsal stripe.

Holotype: ♂, Allegany State Park, NEW YORK, July 16, 1936 (E. Greenspan), [in Coll. Franclemont].

The deep fuscous color of the fore wings will immediately separate this form from the normal form which has the ground color of the primaries white; the lack of strong contrast between ground color and markings is also a distinguishing characteristic when compared with the normal form which has the black markings in sharp contrast with the white ground color.

A South African Onthophagus Found in United States (Coleoptera: Scarabaeidae)*

Specimens of an unusual Onthophagus collected by Professor P. W. Fattig near Vidalia and Lyons, Georgia, have been determined as *Onthophagus depressus* Har., a South African species, by Dr. G. J. Arrow of the British Museum. Dr. Arrow, in commenting upon the species states that the same species has been described from Australia under the name *Onthophagus carteri* by Blackburn. Professor Fattig first collected the species at light at Vidalia, Georgia, May 4, 1937. A few more were found August 11 and on August 30, 1937 about three hundred specimens were taken in cow dung at two localities,—three miles southwest of Vidalia and two and one-half miles west of Lyons. These localities are about seventy-five miles inland west of Savannah, Georgia. How and when this African species was introduced into the United States is unknown at present.

* Technical Contribution No. 57 from South Carolina Experiment Station.

O. depressus Har., is uniformly black, broadly oval, evenly convex, 6 to 9 mm., in length, 3 to 5 mm., in width, and shows only slight sexual differences. Clypeus with two teeth as in *Canthon laevis*. Surface of head and clypeus with close transversely elongate granules. Thorax closely coarsely annularly punctate, each puncture bearing a very short coarse yellowish hair and having a more or less noticeable granule immediately in front of the hair. Elytral punctures similar but in rows, those of the fine shallow striae similarly annular but without the hair and granule. In size and color, *O. depressus* Har., is nearest our common *O. hecate* Panz.—O. L. CARTWRIGHT, South Carolina Experiment Station, Clemson, South Carolina.

Some Interesting Butterfly Records for South Florida.

The following records of butterflies taken in or around Miami, Florida, seem to be new or of some interest:

Anteos maerula maerula (Fabricus). A single damaged specimen of this tropical American species was taken by the author on July 8, 1935. Another specimen taken at Miami is in the possession of Mrs. C. N. Grimshawe. It is apparently only an occasional immigrant from the Antilles to judge from the badly beaten condition of the specimens I have seen.

Kricogonia lyside (Godart). Several specimens of this rather rare species were taken by the author during June, 1937. The first specimen was taken at Miami, June 13, 1937, and about a dozen others were taken on Virginia Key in Biscayne Bay between June 15 and 17. The latter specimens were all taken feeding on the flowers of black mangrove trees along the beach. From the fresh condition of most of the specimens, I should say that the species breeds in Florida.

Hypolimnas misippus (Linneus). A male of this butterfly was taken during April, 1934, in a grove at Miami. This insect seems to have been very infrequently taken in the New World.

The specimens mentioned above, with the exception of the specimen taken by Mrs. Grimshawe, are now in the collection of the Museum of Comparative Zoology, Harvard College.—FRANK N. YOUNG, Department of Biology, University of Florida.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or last year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Dymond, J. R.**—External parasites of bats. [4] 70: 20-21. **Knaus, Warren.**—Obituary by G. A. Dean. [103] 11: 1-3. **Weiss, H. B.**—The criminal prosecution of insects. [6] 45: 241-258.

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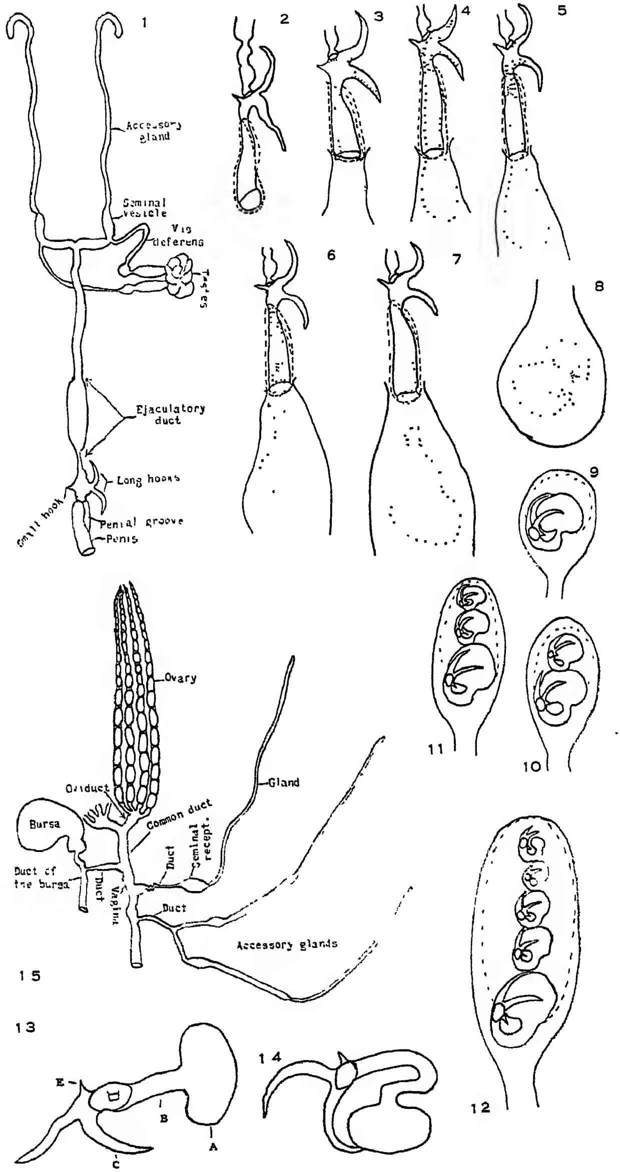
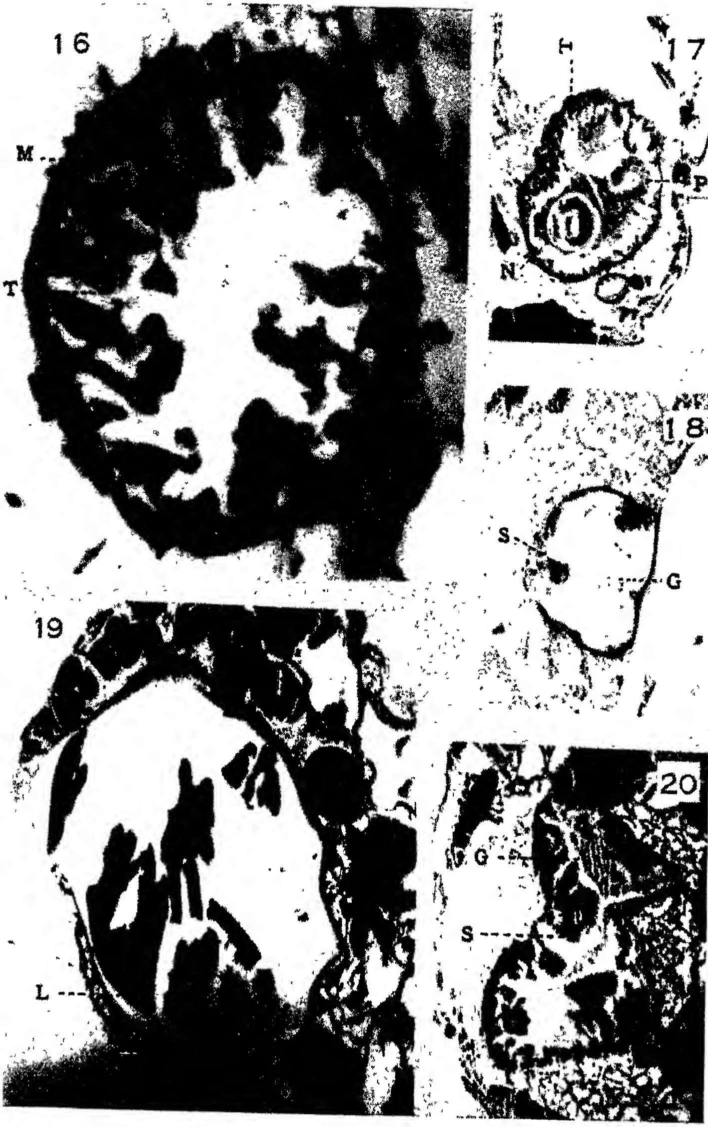


EPHESTIA KUEHNIELLA—WILLIAMS.



EPHESTIA KUEHNIELLA—WILLIAMS

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The Mating of Ephestia kuehniella Zeller and its Results.

By Joseph L. Williams, University of Pennsylvania and Lincoln University, Pennsylvania.

(Plates II and III.)

(Continued from page 107.)

Internal Changes in the Bursa.

When a female emerges from the pupa, and is immediately killed, her bursa is transparent and appears empty. If a virgin female be allowed to live for a few days, her bursa becomes somewhat thicker. A granular cheesy material has formed at the closed end. (Plate III, Figs. 18 and 20). Chitinous teeth are formed in the lower part of the bursa just above the duct leading to the vagina. (Plate III, Fig. 16.).

If a virgin female be allowed to mate, and the bursa be examined a short while after mating, one sac of sperms will be found in the lower part of this organ, (Plate II, Fig. 9). The sac of sperms seems to be held firmly by the bursal teeth in the lower part of the organ, (Plate III, Fig. 17). There is a gelatinous substance at the top, (Plate III, Fig. 19.). at about the same position as the granular cheesy material in the virgin bursa. This gelatinous substance and the muscle fibers of the bursa are stained by borax carmine, but the sperm sac does not take the stain. Eosin, however, will stain the sperm sac. This staining property suggests that the sperm sac is of chitin. If a female that has mated once be allowed to live until indicating readiness to mate again, and the bursa be examined, the sperm sac does not appear as large as it does after mating. This suggests that the sperms have been used.

If a female be allowed to mate twice, and her bursa be examined a little while after, two sperm sacs will be found in this organ, (Plate II, Fig. 10.). The last sac, which is the filled

one, will be at the bottom or hind end, surrounded by the chitinous teeth of the bursa. The first sac which now appears to be empty, is above the filled sac. The gelatinous substance which stains red with borax carmine is above the empty sac.

If a female be allowed to mate three times, three sacs will be found upon examining the bursa, (Plate II, Fig. 11.). The filled and largest sac will be found below surrounded by the chitinous teeth of the bursa. The next larger sac will be found in the center of the bursa, and the smallest sac will be found at the top. Between the smallest sac and the upper bursal wall, is the gelatinous substance that stains red with borax carmine.

I have not observed a fourth mated bursa, nor have I ever found a female from moth stock boxes, with four sperm sacs in the bursa. I have observed, however, females from stock boxes with five sacs in the bursa, but never more than five, (Plate II, Fig. 12.). The filled sac is always at the bottom and the smallest one at the top. On top of the smallest sac is the gelatinous substance that stains red with borax carmine. Females under observations have mated three times. Each sperm sac found in the bursa indicates a mating. Females from the stock boxes whose bursae contain five sperm sacs must have mated five times. Females with one or two sperm sacs are rather numerous in the stock boxes. Females with three sacs are less numerous, while those with five sacs are still fewer. This seems to indicate that three matings are the average in the life of *Ephestia kuehniella.*

Description of Sperm Sac.

The sperm sac is a bag with a somewhat cylindrical chitinous neck. The end of the neck is bifurcated forming two hooks. A little above the bifurcated neck is an opening for the entrance of sperms, from the male. On the opposite side of the sperm aperture is a smaller hook, (Plate II, Figs. 13 and 14). If a mating couple be killed and the bursa be examined, the penis will be found in the bursal neck. The bag of the sperm sac will be surrounded by the bursal teeth, (Plate II, Fig. 3.). The neck of the sperm sac passes down through the penis. The opening just above the bifurcated neck fits closely against the

terminal opening of the ejaculatory duct of the male, being held in position by all the hooks of the sperm sac, fitting tightly into all the hooks at the root of the penis. The sperms are forced from the ejaculatory duct, through this opening, into the neck of the sperm sac, through which the sperms enter the bag.

Function of the Bursa and Sperm Sac Formation.

The bursa secretes layers of a cheesy, granular substance that remains granular, (Plate III, Figs. 18 and 20.), as long as the female is virgin. When the female mates, a secretion flows into the bursa (from the male?), that may react with the cheesy granular material, for the latter now becomes gelatinous and arranged in layers, (Plate III, Fig. 19). Previously mated females whose bursal cavities contain more than one sac, have the empty sacs and part of the newly-formed filled sac embedded in this secretion.

The sperm sac is formed by a secretion hardened in the penial region which serves as a mould. A small hollow hook and two longer ones at the penial base mould the small hook and two longer hooks of the sperm sac, (Plate II, Fig. 3.). The aperture in the neck of the sac is formed by the entrance of sperms and accessory gland secretion breaking through a thin membraneous region of the sac held firmly against the opening of the ejaculatory duct, by the insertion of the sac hooks into the hollow hooks at the penial base. As sperms and accessory gland secretion flow into the neck, in order to accommodate this mass, the body of the sperm sac is formed under pressure and distended into the bursal cavity, (Plate II, Fig. 3.).

The secretion responsible for the sperm sac formation may be male, female, or both. According to Norris (1932), the sperm sacs or "spermatophores", of *Plodia,* are formed from secretions of the unpaired glands of the male system.

Their formation according to Norris is as follows:

I. The secretion of the lower unpaired gland [of the male] flows into the bursal cavity and hardens into a gelatinous mass.

II. The secretion of the second unpaired gland flows into the ductus ejaculatorious and visiea where it hardens from with-

out inwards and is consequently moulded to the form of the duct.

III. The secretion of the upper unpaired gland flows into the ductus, pushing before it the still soft core of the previous secretion and causing the tip of the latter to bulge out of the mouth of the vesiea into the bursal cavity.

IV. The bulging tip is further distended by the entrance of the sperm, and the body of the spermatophere is formed.

V. The secretion of the accessory gland flows into the spermatophore and mixes with the sperm.

VI. The neck of the spermatophore is drawn out of the ductus ejaculatorious and bent up inside of the sac.

When the body of the sperm sac is full, muscular contraction of the bursal muscles upon it, aided by the chitinous teeth located in that region, and the repeated pushing of the ovipositor, guided by the penial groove, against the hollow hooks of the base of the penis, may cause the loosening and release of the sperm sac hooks inserted in them, (Plate II, Figs. 3-8.). When the sac is completely in the bursa, the male releases the female by removing his claspers from her. Contraction of the bursal muscles upon the body of the sperm sac forces sperm from it, through the bursal duct and vagina into the seminal receptacle, (Plate II, Fig. 15.).

THE SPERM PATH THROUGH THE FEMALE ORGANS.

Four females were taken from the stock boxes, killed, and their reproductive organs dissected from their bodies. The bursa, bursal duct, vagina, seminal receptacle and its duct, were separated, stained with borax carmine, dehydrated, cleared and embedded in paraffin. The parts of each female were kept separate. Sections were made six microns thick, stained with Delafield's hematoxylin and counter-stained with eosin.

In one female, sperms were found in the lower bursa, seminal duct, vagina and seminal receptacle. In another, sperms were found in the bursa, but in no other part. In the other two, remains of sperm sacs were found in the bursa but no sperms. I dissected the reproductive organs from a female known to be virgin, and treated the parts the same as above. I found no sperms or remains of sperm sacs.

The results suggest that there is a time just before laying, when sperms move from the bursa to the seminal receptacle. When the seminal receptacle is filled with sperms, the sperm sac in the bursa is partly emptied or emptied at once. If the sperm sac in the bursa is partly emptied, there may be enough sperms left in the sac to fill the seminal receptacle again. If the seminal receptacle's capacity is the same as that of the sperm sac, the sac may be emptied during the sperm transfer. When the seminal receptacle and sperm sac are empty, the empty sac is small enough to be released from the chitinous teeth in the lower bursa, and it is forced, or floated, up toward the top. When this condition exists the female is ready for another mating.

Summary.

The contents of this paper grew out of a desire to verify Arnold Pictet's observations of Double Copulation in *Lasiocampa quercus*. Observations of *Telea polyphemus* and *Ephesita kuehniella* fail to furnish this verification. In hundreds of moths of the latter species, the penis was found in the bursal opening only. The same female may pair from one to five times, each pairing results in the formation of a sperm sac (spermatophore of Norris 1932). A maximum of five sacs was found in the bursa of a single female. The mode of formation of these sacs within the penis of the male, when it is thrust into the bursal duct, is described. The contents of each sperm sac are emptied before the next following copulation. The sperm passes from the sperm sac in the bursa to the seminal duct, to the vagina, and then to the seminal receptacle.

The writer is indebted to Dr. P. P. Calvert for suggesting the problem and for his direction during its progress. He is also grateful to Dr. P. W. Whiting for generous supplies of moths during the course of the investigation.

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Explanation of Plates.

Plate II.

Fig. 1: The Male Reproductive Organs.

Figs. 2-8: Diagrams (based on preparations mounted as slides) to Show the Formation and Movement of Sperm Sacs from the Male to the Bursa; 2—Penis showing the two long pockets, small pocket, and the opening of the ejaculatory duct; 3—Sperm sac being formed with the bag slightly distended into the bursa; 4—The sperm sac being pulled away from the opening of the ejaculatory duct; 5—The opening in the neck is in the middle region of the penis; 6 and 7—Sperm sac is nearly in the bursa; 8—Sperm sac in the bursa. Dotted line shows sperm sac, broken line shows the hard chitin of the penis. Figs. 9-12: Sperm Sacs in the Bursa; 9—One sperm sac in the bursa; 10—Two sperm sacs in the bursa; 11—Three sperm sacs in the bursa; 12—Five sperm sacs in the bursa. Figs. 13, 14: Two Views of the Sperm Sacs removed from the Bursa; A—Bag of sperm sac; B—Neck of sperm sac; C—Long hook of sperm sac; D—Opening in the neck for the entrance of sperms and accessory gland secretion during its formation; E—Small hook of the sperm sac.

Fig. 15: The Female Reproductive Organs:

Plate III.

Figs. 16-20: Cross Sections at Different Levels of the Virgin's and Mated Female's Bursae:

16—Cross section of lower virgin bursa, showing the circular muscle fibers M and chitinous teeth T; 17—A bursal cross section of a mated female showing sperm sac P between the chitinous teeth of the bursa, also a cross section of sperm sac neck N; 18—Cross section near the closed end of a virgin bursa showing layers of granular cheesy material G and secretion cells S.; 19—A bursal cross section of a mated female, showing the gelatinous secretion L in layers; 20-Cross section of the virgin bursa, showing layers of granular cheesy material G and secretion cells S.

The Bees of the Genera Chelostomopsis, Formicapis, Robertsonella and Prochelostoma. (Hymen.: Megachilidae).

By CHARLES D. MICHENER, University of California, Berkeley.

Although not closely related to one another, the four genera of Osmiinae considered in this paper all have the general aspect of *Chelostoma,* being small, black, and finely punctured. Each is represented by a single species, restricted to North America.

CHELOSTOMOPSIS Cockerell.

Chelostomopsis Cockerell. 1925, Proc. Calif. Acad. Sci. (4) 14: 205.

Raphidostoma Cockerell, 1936, Pan-Pac. Ent., 12: 133. (n. syn.).

Black; head rather large; maxillary palpi four-segmented, longer than last two segments of labial palpi together; second segment of labial palpus a little over twice as long as first, third segment much narrower basally than apically; glossa nearly twice as long as facial line; prepectal carina absent; notauli linear; metanotum and base of propodeum nearly horizontal; first recurrent vein beyond first transverse cubital; base of first tergite smooth and polished, slightly concave, and bounded by a very weak carina; abdomen of male with only six exposed tergites.

The genotype and only species is *C. rubifloris* (Ckll.). *Chelostoma australis* Ckll. (*Chelostomopsis* Cockerell, 1925) and *C. lutzi* Ckll. are both to be placed in *Ashmeadiella.*

CHELOSTOMOPSIS RUBIFLORIS (Cockerell).

rubifloris Cockerell, 1898, Can. Ent., 30:50 (*Chelynia*).

edwardsii Cockerell, 1916, Entomologist, 49:157 (*Chelostoma rubifloris* subsp.) (n. syn.).

ceanothi Cockerell, 1936, Pan-Pac. Ent., 12:134 (*Raphidostoma*) (n. syn.).

♀: Mandibles longer than eye, weakly bidentate at apex; labrum of about the same length, truncate at apex; clypeus broad and low, with long, slender, dorso-ventrally flattened, median process; inner orbits diverging below; cheek broader than eye seen from side; head finely and closely punctate;

thorax finely and closely punctate; propodeum with a basal rugoso-striate band, below which is a polished, impunctate area; abdomen more finely and sparsely punctate than scutum, with distinct apical bands of pubescence on first four tergites. Length 5½ to 9 mm.

♂: Mandibles bidentate, of normal size; labrum not enlarged; inner orbits converging below for lower portions; clypeus densely white hairy; structure of thorax and punctation similar to female; apex of abdomen turned under; margin of sixth tergite produced and rounded medially, broadened into rounded angles laterally; profile of sixth tergite strongly convex basally, concave apically; process of coxopodite elongate, straight, flat, club shaped, with few short hairs; parameres slender, acutely pointed, their apical halves not united; abdominal bands very weak. Length 4½ to 7 mm.

Raphidostoma ceanothi, the type of which is in the collection of the California Academy of Sciences, is the male of *C. rubifloris.* Since females from any one locality present all extremes in size, the name *edwardsii* (type in the British Museum), must be regarded as synonym.

This species is distributed through the Pacific states, mostly in mountain and foothill regions. Type locality: Seattle, WASHINGTON. The holotype is in the collection of the United States National Museum.

CALIFORNIA: Eagle Rock Hills, Los Angeles County, April 14, 1933, on *Rhamnus crocea;* Tetley Park, San Bernardino Mountains, May 16, 1936, on *Nemophila;* Crystal Lake, San Gabriel Mountains, July 7, 1934, on *Verbena prostrata;* Altadena, June 1, 1935, on *Lotus;* Eagle Rock, April 7, 1936, on *Salvia mellifera;* Mt. Diablo, April 26, 1937, on *Phacelia* (all Michener, collector); Cajon Pass, April 13, 1936 (G. E. & R. M. Bohart); Cobb Mountain, Lake County, May 7, 1936 (R. M. Bohart); Carrville, Trinity County, 2400 to 2500 feet, May 15, 1934 (G. E. Bohart); Santa Cruz County, 1500 feet, June 8, 1917 (W. M. Giffard); Fairfax, Marin County, April 12, 1921 (C. L. Fox); Yorkville, Mendocino County, May 1, 1924 (E. P. VanDuzee); Coffee Camp, Tulare County, June 11, 1925, on *Lotus glaber* (Timberlake); Swartout Valley, June 3, 1925, on *Phacelia californica* (Timberlake); Crestline, San Bernardino Mountains, May 23, 1936, in *Lotus davidsonii* (Timberlake); Mill Creek, San Bernardino Mountains, May 30, 1936, on *Phacelia brachyloba* (Timberlake); The Gavilan,

March 19, 1936, on *Rhus trilobata* (Timberlake); Valley of the Falls, San Bernardino Mountains, May 25, 1935, on *Phacelia davidsonii* (Timberlake); Sequoia Lake, June 12, 1925, on *Horkelia* (Timberlake).

OREGON: Corvallis, April 12, 1936 (G. Ferguson).

FORMICAPIS Sladen.

Formicapis Sladen, 1916, Can. Ent., 48:271.

Formicapis Cockerell, 1922, Can. Ent., 54:144.

Black, head large; maxillary palpi four-segmented, longer than last two segments of labial palpi together; first segment of labial palpus two thirds as long as second, third segment much narrower at base than at apex; tongue shorter than facial line; prepectal carina absent; notauli linear; metanotum and base of propodeum slightly slanting posteriorly; first recurrent vein nearly interstitial with first transverse cubital; base of first tergite with a short medial sulcus, anterior face of tergite impunctate though dull, in contrast to dorsum, not bounded by a carina; abdomen of male with seven exposed tergites and six exposed sternites.

FORMICAPIS CLYPEATA Sladen.

clypeata Sladen, 1916, Can. Ent., 48:271.

neomexicana Cockerell, 1922 (nec 1904) Can. Ent., 54:144 (misidentification).

♀: Mandibles broad, with large apical tooth, slightly smaller subapical tooth, followed by long edge bearing one or two low teeth; labrum broad basally, tapering to a narrowly rounded apex, and margined with a fringe of yellowish hairs; cheek nearly twice as broad as eye seen from side; clypeus low and broad, with a median snout-like process; clypeus and median part of supraclypeal area sparsely punctate and shiny; thorax and rest of head more closely punctate, duller; abdomen somewhat more finely and sparsley punctate than thorax; tergites with weak apical bands of white hair. Length 6 to 8 mm.

♂: Similar to female but mandibles and clypeus of normal size and shape; labrum shorter and hardly fringed; flagellum brown beneath; seventh tergite four lobed, median lobes rather close together and exceeding the others in length. Length 6½ mm.

Although this species has been called *Formicapis neomexicana* (Ckll.). the type of *Chelostoma neomexicana* Ckll. proves to be an *Ashmeadiella,* thus validating Sladen's specific name.

This species occurs in central Alaska and south to eastern

British Columbia and to Manitoba, and through the Rocky Mountains to Colorado. Type locality: Banff, ALBERTA. The holotype is in the Canadian National Collection at Ottawa.

COLORADO: Pingree Park, Larimer County, August 22, 1935 (Michener). SASKATCHEWAN: Malfort, July 20, 1916 (Sladen, Can. Nat. Coll.) ALBERTA: Nordegg, July 25 and 27, 1936 (E. H. Strickland); Beaverlodge, June 14 and 25, 1931 (E. H. Strickland and O. Peck). BRITISH COLUMBIA: Field, July 1, 1906 (G. Brown, Acad. Nat. Sci. Phil.) ALASKA: Fairbanks, June 30, 1921 (J. M. Aldrich, U. S. N. M.)

ROBERTSONELLA Titus.

Robertsonella Titus, 1904, Jour. N. Y. Ent. Soc., 12:22.

Small, black; maxillary palpi four-segmented, shorter than last two segments of labial palpi; first segment of labial palpus a little less than two thirds as long as second, third segment narrower at base than at apex; glossa a little longer than facial line; prepectal carina absent; notauli linear; metanotum and base of propodeum slanting posteriorly; first recurrent vein beyond first transverse cubital; base of first tergite with a median sulcus and no carina; abdomen of male with seven exposed tergites and six exposed sternites.

ROBERTSONELLA SIMPLEX (Cresson).

simplex Cresson, 1864, Proc. Ent. Soc. Phil., 2:384 (*Heriades*).

gleasoni Titus, 1904, Jour. N. Y. Ent. Soc., 12:23 (n. syn.).

♀: Mandibles short and broad, tridentate; clypeus with anterior margin produced, truncate, the truncation over twice as long as distance from end of truncation to lateral angle of clypeus; inner orbits converging below; cheek a little wider than eye, seen from side; head very finely punctate, clypeus closely so; scutum more coarsely and less closely punctate than vertex; mesepisternum only slightly more coarsely punctate than scutum; punctures of abdominal tergites separated by about their diameters or less; apical margins of abdominal tergites with inconspicuous apical bands of pubescence. Length 6½ to 7 mm.

♂: Similar to female; mandibles bidentate; pubescence of clypeus and lower sides of face very short and dense, of even length; seventh tergite rounded posteriorly. Length 5 to 7 mm.

This species is found from Massachusetts to North Carolina and west at least to Illinois. Type locality: MASSACHUSETTS.

The type is in the collection of the Academy of Natural Sciences of Philadelphia, and is not an *Alcidamea* as has previously been supposed. Specimens from Grand Tower, Illinois, the type locality of *R. gleasoni,* the holotype of which is in the collection of the United States National Museum, show somewhat finer punctation on the first two abdominal tergites than in the more eastern specimens, thus approaching the subspecies *crataegina.* This species appears to be quite rare.

MARYLAND: Cabin John, May 18, 1915, on *Ranunculus* (A. H. Potting, U. S. N. M.). NORTH CAROLINA: Raleigh, May 8, 1924, May 2, 1928, April 30, 1932, all on *Rubus* (T. B. Mitchell).

RORERTSONELLA SIMPLEX CRATAEGINA (Cockerell).

crataegina Cockerell, 1909, Ann. & Mag. Nat. Hist., (8) 4:28.

crataegina Michener, 1936, Am. Mus. Nov., 875:16.

This form is so close to typical *simplex* that it seems unwise to regard it as a full species. It may be distinguished from *simplex* by the somewhat finer punctures of scutum, greater contrast between them and those of mesepisternum, and by finer punctures of tergites, which are separated by more than their diameters.

This subspecies is found in Texas. Type locality: Fedor, Lee County, Texas. Type in the Cockerell collection at Boulder, Colorado. An additional locality is Paris, Texas, April 10, 1904 (F. C. Bishopp, U. S. N. M.).

PROCHELOSTOMA Robertson.

Prochelostoma Robertson, 1903, Trans. Am. Ent. Soc., 29: 167 & 171.

Prochelostoma Titus, 1904, Jour. N. Y. Ent. Soc., 12:24.

Small, black; maxillary palpi four-segmented, shorter than last two segments of labial palpi together; second segment of labial palpus about three times as long as first; third segment narrower basally than apically; glossa a little longer than facial line; prepectal carina absent; notauli linear; thorax elongate, metanotum and base of propodeum horizontal; first recurrent vein beyond first transverse cubital; first tergite with a sulcus at base, and no carina; male with seven exposed tergites.

This genus is close to *Chelostoma,* perhaps a subgenus or a

synonym of it, being distinguished primarily by the shape of the third segment of the labial palpus. The genitalia are similar to those of *Chelostoma.* The process of the coxopodite is nearly straight, and the parameres are broad through pointed apically, and contagious throughout their length.

PROCHELOSTOMA PHILADELPHI (Robertson).

philadelphi Robertson, 1891, Trans. Am. Ent. Soc., 18:64 (*Heriades*).

philadelphia Robertson, 1900, Trans. Acad. Sci. St. Louis, 10:52 (*Chelostoma*).

philadelphi Robertson, 1903, Trans. Am. Ent. Soc., 29:171.

♀: Mandibles long, bidentate, the apical tooth largest; labrum long, truncate apically; clypeus low, apical margin straight; inner orbits slightly converging below; cheeks as wide as eye seen from side; punctation rather fine and not close, that of mesepisternum coarser and sparser than that of head and rest of thorax; dorsal area of propodeum coarsely rugoso-striate; abdomen without hair bands. Length 7 mm.

♂: Similar to female; labrum and mandibles of normal size; mandibles bidentate; cheek somewhat narrower than eye seen from side; seventh tergite with a pair of rather slender, pointed, median teeth, and sharp lateral angles (about right angles). Length 5 to 6 mm.

This species occurs from New York to Georgia and west to Michigan and Illinois. Type locality: ILLINOIS. The type is no doubt in the collection of Charles Robertson, which is still in Carlinville, Illinois.

GEORGIA: Thompson Mills, April, 1910 (H. A. Allard). NORTH CAROLINA: Wilmington (J. T. Riley); Bryson, May 24, 1923, on *Philalelphus* (T. B. Mitchell); Raleigh, May, 1928 (Mitchell collection). VIRGINIA: Washington Country Club, Arlington County, on *Philadelphus* (P. H. Timberlake, J. C. Bridwell). DISTRICT OF COLUMBIA: Washington, June 1, 1907 (Wm. Palmer, U. S. N. M.). MARYLAND: Hyattsville, May 21, 1915, on *Philadelphus coronarius* (A. H. Pottinger). INDIANA: Anderson, June 18, 1913 (M. D. Ellis). OHIO: Columbus, May 24 and 28, 1902 (J. C. Bridwell, U. S. N. M.) PENNSYLVANIA: Harrisburg, May 24, 1908 (P. R. Myers, U. S. N. M.) NEW YORK: Ithaca, June 10, 1914. (U. S. N. M.). MICHIGAN: Ann Arbor, June 10, 1936 (G. Steyskal, Bohart collection).

The Occurrence of Nemobius sparsalsus Fulton in Southern New Jersey. (Orthoptera: Gryllidae).

By HENRY FOX, Department of Biology, University College, New York University.

Fulton[1] in 1930 described *Nemobius sparsalsus* from material taken in salt marshes near Wilmington, North Carolina, and Hebard[2] simultaneously recorded it from four other localities, indicating its probable general occurrence southward along the coast from the type locality to southern Florida and thence west to, at least, Galveston, Texas. So far as recorded, the species is an inhabitant of salt marshes in association with grasses of the genus *Spartina*.

Observations during the past season (1937) have shown that this interesting cricket is not uncommon in restricted areas along the landward margins of the salt marshes in Cape May County, New Jersey. So far it is definitely known only from the two localities listed below, but future search will doubtless reveal its presence in suitable situations throughout the entire County, and perhaps also in the remaining maritime sections of southern New Jersey. By this discovery the known range of the species is extended fully 400 miles north of the type locality, which hitherto has been a northern limital record.

Definite records of the species in southern coastal New Jersey are as follows:

Ocean View, N. J., September 3-4, 1937, 10 ♂, 9 ♀.

Clermont, N. J., September 14, 1937, 10 ♂, 14 ♀.

In addition to the preceding, I found 5 males and 1 female of the same species in an unlabelled lot of *Nemobius*, which was collected mostly at Ocean View, in the early autumn of, I believe, 1931, and preserved in formalin for future study.

Sample specimens from the series of 1937 were submitted to Dr. Fulton, who kindly verified and confirmed my determination of them as the present species.

Fulton, in commenting upon the habitat of *N. sparsalsus* as observed at the type locality, described it as occurring only in

[1] Ent. News XLI: 38-42.

[2] *Ibid*: 42-43.

the thick growth of marsh grass, *Spartina stricta,* which is one of the dominants in the salt marshes of the North Carolina Coast, forming a zone bordering the brackish sounds. He describes this grass as growing about a foot high in a black silty mud partly or entirely submerged at high tide and states that the crickets live about the crowns of the grass and on the ground where they presumably need to be constantly alert to avoid the fiddler crabs which overrun the place[3].

So far as my observations extend, the habitat of *N. sparsalus* in the Cape May section is a very narrow tract, rarely more than a few yards wide, which coincides essentially with the upper limit of daily high tide. The latter forms the boundary between what botanists term the tension zone, lying between dry land and the salt marsh, and those daily flooded portions of the marsh in which fully saline conditions are represented and where the bulk of the vegetation consists of the tough cord grass, *Spartina alterniflora.*[4]. The cricket, however, was not found in ground occupied by this grass, as originally reported by Fulton in North Carolina, but within the adjacent borders of tracts carpeted with a dense matted growth, about a foot high, formed of the two wiry-stemmed grasses, *Spartina patens* and *Distichlis spicata,* the former predominating. These

[3] In a recent letter Fulton informs me that, since he published on this species, he has collected it at the original locality but once and on that occasion found it only in a very narrow zone of *Juncus roemerianus* at the upper limit of high tide, the *Spartina stricta* being flooded at the time. He mentions Dr. B. W. Wells, of the Botanical Department of North Carolina State College, as stating that this *Juncus* in North Carolina forms a zone between *Spartina stricta* and *S. patens.* This is not true of salt marshes in southern New Jersey, where *J. roemerianus* is absent and the zone of *S. patens* immediately adjoins the areas occupied by *S. stricta* (= *S. alterniflora*).

[4] I am indebted to Dr. John Milton Fogg, Jr., of the Botanical Department of the University of Pennsylvania, for the information that this is the currently accepted name among botanists of the grass which in most of the past publications on the salt marshes and their biota was designated *S. stricta,* though I had previously read a statement to the same effect in certain of the more recent reports of the New Jersey Mosquito Extermination Commission. From the latter source I understand that true *S. stricta* is an Old World form, now recognized as specifically distinct from its relative on this side of the Atlantic. In Stone's Flora of Southern New Jersey, our plant is termed *S. glabra,* with *alterniflora* listed as a variety. Dr. Fogg informs me that the local plant is variety *pilosa,* typical *alterniflora* being of more northern range.

grasses belong to the tension zone previously referred to, where they occupy ground which, while low and permanently moist, is sufficiently elevated above the general surface of the marsh to escape flooding except during more or less widely separated intervals of exceptionally high water.

It may conduce to a clearer understanding of the observed haunts of this species in Cape May County to point out that they mark the lowest limit of growth of the so-called "salt hay" of the region, which is extensively harvested in the late summer and fall, the earliest cutting of the hay being coincident with the appearance of the adult cricket. This hay is composed in the main of the two wiry-stemmed grasses previously mentioned, *Spartina patens* and *Distichlis spicata,* and a rush, *Juncus gerardi,* which intermingles with and largely replaces the former on the somewhat higher and firmer sections of the tension zone adjoining the mainland. Cutting of the salt hay ceases abruptly along the line where the tension zone meets the regularly flooded part of the salt marsh dominated by *Spartina alterniflora.* The latter is too coarse a grass for an acceptable component of the hay and moreover grows in ground too soft to support the horses and wagons used to haul the hay.

In its undisturbed haunts *N. sparsalsus* is an extremely difficult insect to capture. The crickets are extremely active and, when rooted out of their shelter in the thick grass, leap rapidly about over the surface for a second or two and then dive down into the tangled wiry mass of stems and leaves and are almost instantly lost to view. Once they have dissappeared in this manner, it is next to impossible to force them to expose themselves a second time. Under these circumstances it was found impractical to capture the insects by holding the open net on the surface of the grass and herding them into it, as was done by Fulton in securing his original series. Instead, they were mostly secured by quickly striking the palm of the hand down upon them as they started to hide in the grass, thereby preventing them from penetrating further and thus making it possible to hold them in place long enough to be extricated by

the fingers. Less frequently individuals were captured by a quick stroke of the net while leaping over the surface. The former method, however, was the more successful, although it often meant damaged specimens.

Collecting the species was much facilitated after harvesting of the salt hay crop had removed a large part of the tangled mass of grass in which the crickets hide. Thereafter the only shelter left for them was scattered wisps of partially cured hay remaining on the ground after the removal of the bulk of the crop. By trampling upon such patches, the insects hiding beneath were much more readily induced to expose themselves than in the uncut grass and were then frequently captured before they succeeded in regaining shelter beneath some other stray wisp of hay.

One of the stations at Ocean View in which *N. sparsalsus* was found is noteworthy because of its virtual isolation from the usual habitat of the species, which, as was previously stated, is located in the tension zone of the salt marsh adjacent to the mainland. The station in question is a small tract, scarcely ¼ acre in extent, isolated in the salt marsh about ⅛ mile from the nearest part of the mainland. Although surrounded on all sides by regularly flooded salt marsh dominated by *Spartina alterniflora,* this tract rises sufficiently above the general level of the marsh to escape daily flooding by the tide, and, in apparent correlation with this fact, the ground supports, and indeed is buried from sight beneath, an extremely dense growth of mostly *Spartina patens.* On the highest part of this tract occurs a small thicket of the shrub, *Iva frutescens* growing up through the grass. *N. sparsalsus* was scarce in this particular station and was only observed in a very narrow tract of the *Spartina patens* lying between the thicket of *Iva frutescens* and the nearest part of the area occupied by *S. alterniflora.*

From Fulton's published account of the habitat of the species in North Carolina, I had supposed that *N. sparsalsus,* if it occurred in New Jersey, would most likely be found in areas of the salt marsh dominated by *Spartina alterniflora.*

The ground where this grass grows is perpetually wet and is formed of a black silty mud, like that mentioned by Fulton. In places where the ground at high tide is covered with more than a few inches of water, as on the shores of the sounds and the banks of the numerous tidal creeks, which tortuously meander over the marsh, this grass reaches its greatest size, growing to a height of 4 to 8 feet, and thus forming a decidedly reedy growth. Elsewhere, over the nearly level, better drained, general surface of the marsh, on which the water at high tide normally averages less than 2 inches deep, the same grass grows only from about a foot to knee-high, thus giving the landscape the general appearance of a meadow rather than a marsh[5]. This shorter grass forms a much closer stand than the tall variety and, because of this fact, as also on account of the better drainage, the ground occupied by it, although wet, is ordinarily sufficiently firm to be likened to a turf. On the other hand, the ground occupied by the reedy type is a quite soft, oozy mud, largely bare in the relatively wide interspaces between the crowns of the plants. Such surroundings form the favored haunts of the fiddler crabs which abound there, whereas they are much less numerous in the denser growth formed by the short variety of the grass.

Although the type of environment last described would seem to correspond closely with the habitat of *N. sparsalsus* as described by Fulton, all my efforts to find it,—or, for that matter, other species of cricket—, in similar surroundings in New Jersey have been fruitless. This remark applies to areas dominated by all forms of *Spartina alterniflora* irrespective of the height attained by the plants or the density of the growth formed by them.

In the special type of grassland formation in which *N. sparsalsus* has been found in Cape May County, fully mature fiddler crabs appear to be scarce, the compact, matted growth making it difficult for them to move about readily. However, the section of the same formation which adjoins the area occupied by *Spar-*

[5] It is probable that much of this condition has resulted from the digging of innumerable drainage ditches which accommodate much of the water which would otherwise overflow the general surface.

tina alterniflora affords shelter to large numbers of young fiddlers, of about tht same size as the *Nemobius,* and so like the latter in tint and superficial aspect that I frequently caught them by mistake while hunting for the crickets. So far as I observed, there were no indications that these young fiddlers ever disturb the *Nemobius,* except perhaps as a result of mere mechanical contact.

Wherever *N. sparsalsus* occurred, I found it associated with much greater numbers of *N. fasciatus socius*[6]. The latter in general, however, appeared to prefer slightly dryer ground, being most numerous in those sections of the *Spartina patens* where that grass intermingles with and is largely replaced by *Juncus gerardi.*

Nemobius cubensis was also a rather regular associate, but occurred in much smaller numbers than *N. fasciatus socius.*

Although *N. sparsalsus* was present in limited areas in fairly considerable numbers, it seems to be rather local or erratic in its distribution in the section of Cape May County where it was discovered. Although the time available precluded extensive search, on more than one occasion I looked for it in vain in several places along the margins of the salt marshes near Ocean View where, to all appearances, ground and vegetational conditions were identical with those in other stations where the species was found without difficulty.

Where To Collect Insects?

By H. Elliott McClure, Iowa State College, Ames, Iowa.

When students in entomology at the University of Illinois formed a collector's club, the first question discussed was where to collect insects. This may best be answered by stating that they may be found everywhere and all the time, but certain groups are restricted to definite habitats and many interesting forms may be found in unusual places.

The accompanying outline is an attempt to list the habitats usual and unusual in which insects and their relatives may be

[6] Reference confirmed by B. B. Fulton on the basis of examples sent him.

collected and something of the groups available in them. It may serve to call to mind other places for collecting and other groups to take.

As a general rule, collecting should be done at night as well as during the day, for many soil and soil surface forms are on the foliage at night. Mesic situations heavily overgrown generally yield better collecting than drier or upland habitats.

A. Indoors.

1. Dwellings: bedbugs, roaches, fleas, clothes moths, etc. Basements: Spiders, house centipedes, silverfish, psocids, midges, box elder bugs, squash bugs, camel crickets, crickets, etc.

2. Greenhouses: Mites, mealy bugs, scales, white fly, sow bugs, millipeds, psocids, leaf tyers, Collembola, midges, thrips, psychodids, etc.

3. Mushroom beds: Mites, Collembola, fungus gnats, staphylinids, etc.

4. Barns: Flies, hibernating insects in straw and under boards, flea larvae, etc.

5. On stock and pets: Lice, ticks, fleas, mites, sheep ticks, bot flies, warbles, etc.

6. Warehouses: Weevils and moths in candies, fruits and tobaccos, flies, spiders, etc.

7. Museums: Dermestids, psocids, etc.

8. Grain bins: Stored grain insects.

9. Jails and Gymnasiums: Lice, bedbugs, etc.

B. Outdoors.

1. Aquatic.

a. Streams.

Riffles: Plecoptera, Heptagenia, longtoed water beetles, Corydalis, Hydropsyche, Similium, tipulids, etc.

Pools: Hexagenia, hydrophilids, dytiscids, chironomids, water striders, gyrinids, Odonata, etc.

Banks: Haliplids, toad bugs, Collembola, spiders, Plecoptera, etc.

b. Temporary pools: Trichoptera, dytiscids, hydrophilids, corixids, notonectids, Eubranchipus, amphipods, ostracods, copepods, isopods, etc.

c. Lakes and ponds: Chironomids, beetles, Hexagenia, Trichoptera, etc.

d. Oceans.

Tide rack: Dermaptera, ephydrids, beetles, crustaceans, etc.

Open water: Water striders, beetles, etc.
Marine mammals: Lice, parasites, etc.

2. Swampy situations.

a. Rush swamps: Tabanids, tipulids, belastomatids, aquatic Hemiptera, aquatic Coleoptera, etc.

b. Lowlands: Tabanids, tipulids, fly larvae, beetles, mosquitoes, etc.

c. Bogs: Staphylinids, spiders, wide variety of beetles, parasites, psocids, etc.

3. Terrestrial.

a. Subterranean: Cave crickets, cave insects, etc.

b. Bare Ground and banks: Digger wasps and their parasites, Bembidion, cicindellids, heterocerids, carabids, etc.

c. Cliffs: Mud daubers and their parasites, flies, solitary bees, etc.

d. Sand: Cicindellids, trap door spiders, myrmeleonids, white grasshoppers, etc.

e. Prairie.

Soil: White grubs, ants, Dermaptera, elaterids, millipeds, mites, etc.

Soil surface: Chinch bugs, other Hemiptera, spiders, minute beetles, Collembola, mites, etc.

Plants, especially when in bloom: Vast numbers of forms including thrips, flies, beetles, locustids, moth larvae, mantids, mordellids, rhipiphorids and other rare beetles, Hymenoptera, etc.

f. Gardens.

Soil: Mole crickets, elaterids, Diabrotica, tenebrionids, moth pupae and larvae, etc.

Plants: Moths, butterflies, cutworms, beetles, hornworms, bees, wasps, aphids, etc.

g. Field Crops: Seed chalcids, ear worms, weevils, meloids, chrysopids, hemerobiids, spiders, etc.

h. Pasture: Locustids, mantids, meloids, piesmids, Orius, spiders, mites, Collembola, etc.

i. Orchards.

Soil: Cicadids, white grubs, elaterids, tenebrionids, etc.

Soil surface: Silphid larvae, ants, carabids and larvae, teleophorid larvae, Collembola, pseudoscorpions, mites, etc.

Weeds: Abound with insects including chrysopids, Tetraopes, flies, wasps, butterflies, Hemiptera, ants, etc.

Trees: Scales, loopers, coccinellids, aphids, tingids, etc. Bloom visited by numerous flies, wasps, moths, beetles, etc. Fallen fruit visited by bees, flies, butterflies, beetles, etc.

j. Forest.

Deciduous.

Soil: Ants, elaterids, bibionids, cicadas, mites, etc.

Soil surface: Collembola, mites, spiders, pseudoscorpions, beetles, thrips, fly larvae, beetle larvae, Hemiptera, fulgorids, staphylinids, tingids, ants, etc.

Herbs: Leafhoppers, flies, Hemiptera, chrysomelids, Mecoptera, psocids, minute beetles, ants, etc.

Shrubs: Chrysomelids, moth larvae, spiders, tingids, fulgorids, Mecoptera, membracids, chermids, gall insects, minute beetles, ants, etc.

Trees: Spiders, pentatomids, weevils, cerambycids, moth larvae, phasmids, psocids, membracids, tettigoniids, gall insects, etc.

Evergreen.

Soil: Ants, tenebrionids, Dermaptera, etc.

Herbs and Shrubs: About the same as the deciduous forest.

Trees: Scale insects, bud worms, loopers, tenthredinids, scolytids, etc.

4. Trees.

a. Living: Borers in stems and trunks, leaf eaters, galls, etc. Eggs and cocoons on bark.

b. Dead: Under Bark: Histerids, aradids, borers, tipulids, staphylinids, centipedes, mites, Collembola, etc.

In Trunk: Passalids, elaterids, ants, termites, beetle larvae, centipedes, Collembola, insects differ with the degrees of decay, etc.

In Stumps: Termites, cucujids, ants, etc.

5. Fungi: Mycetophilids, drosophilids, staphylinids, fungus beetles, Collembola, fly larvae, mites, etc.

C. Miscellaneous Situations.

1. Hanging leaves in winter time: Moth cocoons and larvae, spiders, pentatomids, etc.

2. Galls: Trypetids, cecidomyids, cynipids, chalcids, ichneumons, ants, mordellids, minute beetles, etc.

3. Manure: Scarabeids, drosophilids, flies, other beetles, muscoids, silphids, staphylinids, butterflies, mites, Collembola, etc. Different kinds and different ages of manure have different insects visiting it.

4. Flowers: Meloids, cantharids, dolichopodids, mordellids, ptiliids, other minute beetles, thrips, triungulin larvae, geometrids, rhipiphorids, enicocephalids, syrphids, pscoids, phymatids, etc.

5. Cacti: Hemiptera, tettigoniids, moth larvae, etc.
6. Cattails or rushes: Moth larvae, parasites, hibernating insects.
7. Stalks of weeds: Moth larvae, Hymenoptera, beetle larvae, etc.
8. Birds: Mallophaga, fleas, mites, etc.
9. Birds' nests: Staphylinids, mites, mallophaga, spiders, fly larvae, hibernating insects, scavenger insects, etc.
10. Garbage: Flies, stratiomyids, beetles, butterflies, etc.
11. Dead animals: Silphids, staphylinids, histerids, scarabeids, dermestids, sarcophagids, etc. Varies with the age of the corpse.
12. Freshly killed or live wild animals: Fleas, lice, platypsillids, mites, etc.
13. In the air: Sciarids, chironomids, aphids, staphylinids, minute beetles, minute Hymenoptera, coccids, spiders, muscoid flies, etc.
14. Ant and termite nests: Pselaphids, staphylinids, histerids, flies, scydmaenids, silphids, other termitophiles, etc.
15. Under stones: Ants, carabids, larvae, Myrientoma, Embioptera, Grylloblatta, centipedes, millipeds, etc.
16. Old paper wasp nests: Roaches, spiders, mites, etc.
17. Honey bee and Bumble bee nest: Moths, chrysidids, volucella larvae, etc.
18. Mouse runs and nests: Fleas, lice, Collembola, carrion beetles, etc.
19. Crotches or stumps filled with water: Rat-tailed maggots, other larvae, fungus beetles, etc.
20. Oil pools: Fly larvae, etc.
21. Traps: Bait traps: Wasps, moths, beetles, flies, etc.

Light traps: Moths, tipulids, Plecoptera, Trichoptera, cicadellids, numerous Hymenoptera, numerous beetles, phasmids, numerous Hemiptera, etc.

Bands on trees, tarpaper, corrugated paper, gunnysacks or other material: Roaches, piesmids, curculionids, trogositids, spiders, cerambycids, moth larvae, mites, centipedes, millipeds, Collembola, etc.

Rearing insects yields you the adults of any immature forms that you are successful in feeding and keeping alive.

It is not necessary to cease collecting with the advent of cold weather, as insects are almost as abundant in the winter as in the summer. Following are some suggestions as to where to collect in the winter:

Sweeping plants yields spiders, Plecoptera, chermids, beetles, and others.
Under stones.
Dead leaves hanging on trees and shrubs.
In old stalks of plants.
In logs and stumps.
In aquatic situations.
Under bridges and ledges—for Plecoptera mainly.
In old buildings.
In soil surface debris.
Among grass roots.
Along fence rows.
In birds' nests.
In wasps' nests.
On and under bark of living trees.
In mouse runs and burrows.
On domestic animals.
On freshly killed game.
Indoors.
Under dead animals.

Supella supellectilium (Orthoptera, Blattidae) in Pennsylvania.

In a recent paper Mr. E. A. Back, of the United States Department of Agriculture (Proc. Entom. Soc. Wash., XXXIX, pp. 205-213, figs. 1 and 2, pls. 18 and 19, 1937) has called attention to the spread of the circumtropical cockroach *Supella supellectilium* (Serville) over a considerable portion of the United States. The most northern of the records cited by him are in the Mississippi Valley and the southern Great Lakes region, i. e. Kansas City, Missouri; [Lincoln,] Nebraska; Urbana and Chicago, Illinois; Indianapolis, Indiana. No records from north of Atlanta and Savannah, Georgia are given for the Southeastern or Atlantic States.

Some weeks ago my colleague Mr. E. T. Cresson, Jr., brought to me a male individual of this species taken in his home at Swarthmore, Delaware County, Pennsylvania, February 8, 1938. This is apparently the first noted occurrence of the species anywhere near the coast north of Savannah.

The interior marginal records given by Back can also be amplified by the following ones drawn from material in the Hebard Collection at the Academy of Natural Sciences of Philadelphia: Fort Leavenworth, Kansas; V, 19, 1935; (T. C. Lawrence); 2 ♂, 1 ♀: Springfield, Illinois; XII, 17, 1935, in hotel; 1 ♂.

Back has overlooked the fact that *Supella supellectilium* recently has been recorded from the southwestern United States, i. e. Tucson, Arizona, by Hebard (Trans. Amer. Entom. Soc., LXI, p. 273, 1935). The material on which this record was based includes both sexes, and the species doubtless is there well established.—JAMES A. G. REHN.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or last year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )** follows; then the pagination follows the **colon :**

Papers published in the Entomological News are not listed.

GENERAL.—**Bishopp, F. C.**—Entomology in relation to conservation. [12] 31: 1-11. **Czyzewski, J. A.**—Zygmunt Mokrzecki, a prominent Polish entomologist. [Polski Pismo Ent.] 14-15: 1-80, ill. **Davis, W. T.**—Natural history records from the meetings of the Staten Island Nature Club. [Proc. Staten Isl. Inst. A. & S.] 8: 19-57. **Granovsky, A. A.**—Insects in relation to diseases of truck crops. [12] 31: 11-19. **Haldeman, S. S.**—Some Historical material relating to by H. B. Weiss. [6] 46: 45-48. **Innes, Walter Francis**—Obituary. [Bull. Soc. R. Ent. Egypt] 21: 173-174, ill. **Keen, F. P.**—Insect enemies of western forests [U. S. D. A. Misc. Publ.] no. 273: 209 pp., ill. **Keler, S.**—Zur Nomenklatur einiger Mallophagen-genera. [Polski Pismo Ent.] 14-15: 313-323. **Kunkel, L. O.**—Insects in relation to disease of fruit trees and small fruits. [12] 31: 20-23. **Leach, J. G.**—Insects in relation to diseases of shade and forest trees. [12] 31: 23-24. **Minkiewicz, R.**—Les lois de la sexualisation des couleurs chez les insectes. [Polski Pismo Ent.] 14-15: 144-214, ill. **Murillo, L. M.**—Sentido de una lucha biologica. [Rev. Acad. Colombiana] 1: 376-410, ill. **Nuttall, G. H. F.**—Obituary. [4] 70: 40. **Poos, F. W.**—Insects in relation to diseases of cereal and forage crops. [12] 31: 24-39. **Riley, N. D.**—Entomo-museology. [31] 141: 348-349. **Tillyard, R. J.**—Obituary by A. D. Imms. [12] 31: 135-136. **Weiss, H. B.**—Some historical material relating to Prof. S. S. Haldeman. [6] 46: 45-48.

ANATOMY, PHYSIOLOGY, ETC.—**Brauns, A.**—Die "Pflockchen" der Anthomyiden (Diptera). [34] 121: 137-149, ill. **Busnell, R. G.**—Influence du regime alimentaire sur la biochimie et la biologie du Leptinotarsa decimlineata a l'etat d'insecte parfait: Action du Solanum demissum et des hybrides de cette plante. [C. R. Acad. Sci.] 206: 694-696. **Chauvin, R.**—Anatomie et histologie du tube digestif de Schistocerca gregaria (Orth: Acrididae). [Bull. Soc. Hist. Nat. Afr. Nord] 28: 488-499. **Craig & Clark**—The pH concentration and buffer value of the blood of larvae of Pieris rapae & Heliothis obsoleta. [12] 31: 51-54, ill. **Dorman, Hale & Hoskins.**—The laboratory rearing of flesh flies and the relation between temperature, diet and egg production. [12] 31: 44-51. **Evans, A. C.**—Studies in the distribution of nitrogen in insects. I. In the castes of the wasp Vespula germanica. [107] A, 13: 25-29. **Hilton, W. A.**—Nervous system & sense organs. LXX.—Euplexoptera. LXXI.—Ephemerida. [13] 30: 26-29; 30-35, ill. **Lawrence, R. F.**—The odoriferous glands of some So. African harvest spiders. [Trans. R. Soc. S. Africa] 25: 333-342, ill. **Levereault, P.**—The morphology of the Carolina mantis (Orthoptera). [Univ. Kans. Sci. Bull.] 24: 205-259, ill. **Maloeuf, S. N. R.**—The physiology of arthropodan development with special reference to the insects. [Bull. Soc. R. Ent. Egypt] 21: 88-152, ill. **Misra, A. B.**—A study of the chromosomes of two Japanese spp. of spittle insects belonging to the family Cercopidae (Homoptera). [Journ. Fac. Sci. Hokkaido Imp. Univ.] 5: 255-264, ill. **Querci, O.**—Influence de l'ozone sur les insectes. [Lambillionea] 38: 61-64. **Richins, C. A.**—The metamorphosis of the digestive tract of Aedes dorsalis (Dipt.: Culicidae). [7] 31: 74-87, ill. **Schaefer, P. E.**—The embryology of the central nervous system of Phormia regina (Dipt.: Calliphor). [7] 31: 92-111, ill. **Schulze, P.**—Uber rein glabellare Karapaxbildungen bei Milben und uber die Umgestaltung der Vorderkorpers der Ixodidea als Folge der Gnathosomaentstehung. [46] 34: 135-149, ill. **Stella, E.**—Ricerche citologiche sui nentri e sui riproduttori delle termiti italiane (Calotermes flavicollis e Reticulitermes lucifigus). [Att. R. Acad. Naz. Lincei, Rome] 7; fasc. 1: 3-30, ill. **St. Quentin, D.**—Die Tibialleiste der Odonaten. [34] 121: 225-239, ill. **van Schreven, A. C.**—Uber die sogenannten Tracheenlungen von Gryllus domesticus. [34] 121: 263-264. **Wilder & Smith.**—The Malphigian tubules in the adult Melanotus com-

munis (Coleop: Elateridae). [7] 31: 61-67, ill. **Yeager, J. F.**—A modified Wright's blood-staining procedure for smears of heat-fixed insect blood. [7] 31: 9-14.

ARACHNIDA AND MYRIOPODA.—**Baerg, W. J.**—Tarantula studies. [6] 46: 31-43, ill. **Binns, J.**—The black-widow spider. [Occ. Pap. Cincinnati Jr. Soc. Nat. Sci.] no. 1; 12 pp., ill. **Bishop & Crosby.**—Studies in American spiders: Miscellaneous genera of Erigoneae, Pt. II. [6] 46: 55-107, ill. (*). **Hilton, W. A.**—Symphyla from Mexico. [13] 30: 13-16, ill. **Kaston, B. J.**—The black widow spider in New England. [Bull. N. Eng. Mus. Nat. Hist.] No. 85: 3-11, ill. **Marcus, E.**—Sobre os Onychophoros. [14] 8: 255-266, ill. **Okamura, T.**—A case of the "triple connection" of dragonflies with a description of the female Gomphus chichibui (Odonata). [Kontyu] 11: 425-427, ill. **Pereira, C.**—Dados ecologicos sobre ovas e nymphas hexapodos de Boophilus microplus. [14] 8: 135-144.

THE SMALLER ORDERS OF INSECTS.—**Gurney, A. B.**—A synopsis of the order Zoraptera with notes on the biology of Zorotypus hubbardi. [10] 40: 57-87, ill. (k*). **Palmer, B. B.**—A contribution to the life history of Chimarrha albomaculata from Puerto Rico (Trichoptera: Philopotami.). [7] 31: 69-73, ill. **Ross, H. H.**—Descriptions of new Leptocerid Trichoptera. [7] 31: 88-91, ill. [**Watson, J. R.**]—A new Liothrips from Spanish moss. [39] 21: 14-15. **Wright, M.**—A review of the literature on the Odonata of Tennessee. [Journ. Tenn. Acad. Sci.] 13: 26-33.

ORTHOPTERA.—**Beier, M.**—Mantodea: Mantidae. Subf. Hymenopodinae, Nachtrage. Mantodea: Mantidae, Subf. Toxoderinae, Nachtrage. Mantodea: Mantidae, Subf. Thespinae, Nachtrage. Mantodea: Mantidae, Subf. Mantinae, Nachtrage. [Gen. Insect.] Fasc. 196, 2 pp.; 198, 1p.; 200, 1p.; 203, 3 pp. **Ebner, R.**—Tettigoniidae: Subf. Ephippigerinae, Pycnogastrinae, Bradyporinae, Deracanthinae. [Orth. Cat.] Pt. 1: 1-70. **Rehn & Hebard.**—N. gen. & spp. of West Indian Mantidae & Phasmidae. [1] 64: 33-55, ill. **Rehn & Rehn.**—The Post-oak Locust (Dendrotettix quercus) in the eastern U. S. with notes on macropterism in the species (Acrid.). [1] 64: 79-95, ill.

HEMIPTERA.—**Baker, J. M.**—Notes on some Mexican Aleyrodids. [112] 8: 599-629, ill., (k*). **Barber, H. G.**—A n. sp. of Cistalia (Lygae.). [10] 40: 87-88. **Beamer, R. H.**

—Spp. of Erythroneura of the Comes Group (Cicadell. [Univ. Kans. Sci. Bull.] 24: 261-307, ill., (k*). **Caldwell, J. S.**—The jumping plant-lice of Ohio. [Ohio Biol. Surv.] 6: 229-281, ill., (k*). **Davidson & DeLong.**—Studies of the genus Empoasca (Cicadell.). Twelve n. spp. of Empoasca from the U. S. [43] 38: 90-96, ill. **Doering, K. C.**—A contribution to the taxonomy of the subfamily Issinae in America north of Mexico (Fulgor). [Univ. Kans. Sci. Bull.] 24: 421-467, ill., (k*). **da Fonseca, J. P.**—Contribuaco para o conoheciemento dos Membracideos neotropicos. [14] 8: 231-238, ill. (k*). **Griffith, M. E.**—Alconeura of the U. S. (Cicadell.). [Univ. Kans. Sci. Bull.] 24: 309-341, ill., (k*). **Hempel, A.**—Novas especies de Coccideos do Brasil. [14] 8: 5-36, ill. **Lepage, H. S.**—O novo genero Diaspineo "Costalimaspis" com tres especies novas (Coccoidea). [14] 8: 239-248, ill. (S). **Oman, P. W.**—A contribution to the classification of South American Agallian leafhoppers. [Ann. Carnegie Mus.] 25: 351-460, ill. (k*). **Oman, P. W.**—A generic revision of American Bythoscopinae & South American Jassinae (Cicadell.). [Univ. Kans. Sci. Bull.] 24: 343-420, ill. (k*). **Osborn, H.**—Neotropical Homoptera of the Carnegie Museum. Pt. 7. Report on the spp. of the subf. Gyponinae. [Ann. Carnegie Mus.] 27: 11-62, ill. (k*).

LEPIDOPTERA.—Balduf, W. V.—Bionomic notes on Exartema ferriferanum (Olethreut.) & its parasites, [6] 46: 23-26. **Berry, D. F.**—Description of a new vernal form of Thecla wittfeldii (Lycaen.). [39] 21: 13-14. **Bryk, F.**—Danaidae II: Subf. Ituninae, Tellervinae, Ithomiinae. [Lep. Cat.] Pt. 80: 433-702. Arctiidae: Subf. Callimorpiinae, Nyctemerinae. [Lep. Cat.] Pt. 82: 1-105. **Cadbury, J. W.**—Do you know what butterflies and moths do during the winter? [Frontiers] 2: 97-98, ill. **Klima, A.**—Pyralididae: Subf. Scopariinae, Nymphulinae. [Lep. Cat.] Pt. 84: 1-226. **Sauer, H. F. G.**—O apparecimento de Phylctaenodes bifidalis como praga do algodoeiro no Brasil (Pyraust.). [14] 8: 201-210, ill. **Shepard, H. H**—Hesperiidae: Subf. Hesperiinae I. [Lep. Cat.] Pt. 83: 1-126. **Travassos & d'Alameida.**—Contribuicao para o conhecimento da bionomia de alguns lepidopteros brasileiros. [111] 32: 499-516, ill. **Whelan, D. B.**—Relocation of the type locality of Porosagrotis orthogonia. [6] 46: 22.

DIPTERA.—Blanton, F. S.—Some Dipterous insects

reared from narcissus bulbs. [12] 31: 113-116, ill. **Felt, E. P.**—A note on Lasioptera murtfeldtiana. [6] 46: 44. **Hennig, W.**—Neue Beitrage zur Systematik der Richardiiden und Tyliden. [109] 5: 8-15, ill. (Sk). **Ives, J. D.**—Cave hibernation of mosquitoes. [Journ. Tenn. Acad. Sci.] 13: 15-20. **Johannsen, O. A.**—Aquatic Diptera. Pt. 4.—Chironomidae: Subf. Chironominae. [Cornell. Univ. Agr. Exp. Sta. Mem.] 210: 2-56, ill., (k*). **Landrock, K.**—W sprawie synonimiki rodziny Fungivoridae. Zur synonymie der Fungivoriden [Ann. Mus. Zool. Polonici] 13: 29-32, ill. **Nelson, R. H.**—Observations on Diptera breeding in tomatoes. [12] 31: 128-129. **Owen, W. B.**—The mosquitoes of Minnesota with special reference to their biologies. [Univ. Minn. Agr. Exp. Sta. Tech. Bull.] no. 126, 75 pp., ill. (k). **Painter, R. H.**—The family Apioceratidae in N. Amer. [Univ. Kans. Sci. Bull.] 24: 187-203, ill. (k*). **Pritchard, A. E.**—Synopsis of N. & C. Amer. Holcocephala with a description of a n. sp. (Asilid.). [6] 46: 11-21, (k). **Schmitz, H.** — Beitrage zur einer monographie der Termitoxeniidae. [Broteria, Lisbon] 7: 22-40, ill. **Seguy, E.**—Fam. Muscidae. [Gen. Insect.] Fasc. 205; 604 pp., ill. (k). **Shields & Lackey.**—Conditions affecting mosquito breeding with special reference to Aedes thibaulti (Culic.). [12] 31: 95-102, ill. **de Souza Lopes, H.**—Sobre alguns paratypos de Sarcophagidae conservados no Museu Paulista. [Rev. Mus. Paulista] 21: 839-862, ill. (S). **Thomsen, L. C.** Aquatic Diptera. Pt. 5.—Ceratopogonidae. [Cornell Univ. Agr. Exp. Sta. Mem.] 210: 57-80, ill. (k).

COLEOPTERA.—Abbott, C. E.—The development & general biology of Creophilus villosus. [6] 46: 49-53, ill. **Back, E. A.**—Carpet beetles. [U. S. D. A. Leaflet] no. 150; 6 pp., ill. **Balthasar, V.**—Zweiter Beitrag zur Kenntnis der neotropischen Scarabaeiden. [109] 5: 55-61, (k*). **Blaisdell, F. E.**—A generic synopsis and generic revision of the tribe Dasytini of No. Amer. north of Panama (Melyr.). [1] 64: 1-31, ill., (k*). **Hambleton, E. J.**—A broca do algodoeiro do Brasil Gasterocercodes brasiliensis. [14] 8: 47-106, ill. **Hoffmann, C. H.**—Notes on Leperisinus aculeatus and its parasites (Scolyt.). [12] 31: 118-119. **Knull, J.**—Five n. spp. of Coleoptera (Corynet. Elater. & Buprest.). [43] 38: 97-110. **Liebke, M.**—Beschreibung neuerer Arten der Gattung Agra (Carab.). [107] B, 7:53-72, (Sk). **Mader, L.**—Uber neue und bekannte Erotyliden.

[2] 34: 14-19, (Sk). **Saylor, L. W.**—A n. gen. & two n. spp. of Neotropical Scarabaeidae. [107] B, 7: 72-74.

HYMENOPTERA.—Cory & Haviland.—Population studies of Formica exsectoides. [7] 31: 50-57, ill. **Creighton, W. S.**—On Formicid nomenclature. [6] 46: 1-9. **Davidson & Landis.**—Crabro davidsoni, a wasp predacious on adult leafhoppers (Sphec.). [7] 31: 5-8, ill. **Freeman, P.**—Notes on the nesting of five spp. of Hymenoptera (Sphec.). [107] A, 13: 1-6. **Kamal, M.**—Brachymeria femorata (Chalcid.) a primary parasite of the cabbage worm Pieris rapae. [Bull. Soc. R. Ent. Egypt] 21: 5-27, ill. **Krishnamurti, B.**—A microscopical study of the development of Trichogramma minutum (the egg parasite of the sugarcane borers in Mysore) & its parasitisation of the eggs of Corcyra cephalonica (the flour moth employed in the mass production of Trichogramma). [Proc. Ind. Acad. Sci. Bangalore] 7, B: 36-40, ill. **Krombein, K. V.**—Studies in the Tiphiidae. III. Description of a n. sp. of Neotiphia. [7] 31: 59-60. **Marsh, F. L.**—Biology of the new chalcid parasite Cirrospilus inimicus. [6] 46: 27-29. **Muesbeck, C. F. W.**—Two reared N. A. spp. of the gen. Stantonia (Bracon.). [10] 40: 89-91, ill. (*). **Murray, W. D.**—Some revisions in the gen. Sphex with one n. sp., n. subsp. and n. name. (Sphec.). [7] 31: 17-43, ill., (k). **Nettleton, G. E.**—A n. sp. of Braconidae from Florida. [7] 31: 15-16. **Pate, V. S. L.**—Studies in the Nyssonine Wasps. III. A revision of the gen. Harpactostigma (Sphec.: Gorytini). [1] 64: 57-77, ill. (k*). **Powell, D.**—The biology of Cephalonomia tarsalis, a Vespoid wasp (Bethyl.), parasitic on the saw-toothed grain beetle. [7] 31: 44-49, ill. **Sandhouse, G. A.**—A new N. A. sp. of Crabro (Sphec.). [7] 31: 1-4, ill **Scaramuzza, L. C.**—Breve nota acerca de dos parasitos de "Megachile sp." [115] 12: 87-88. **Smith, M. R.**—A study of the N. A. ants of the genus Xiphomyrmex. [91] 28: 126-130, ill.

A New Check List of the Macrolepidoptera of Canada and the United States of America.

The Southern California Academy of Sciences announces a forthcoming publication that will be of considerable interest to Lepidopterists, particularly to those who have been unsuccessfully endeavoring to obtain copies of the Barnes and McDunnough Check List of N. American Lepidoptera, or the

Barnes and Benjamin List of Diurnal Lepidoptera, both out of print.

The announcement is to the effect that a new "Check List of the Macrolepidoptera of Canada and the United States of America" is now in print.

This is to be issued as Volume One of a new series of "Memoirs" of the So. Calif. Academy of Sciences. It will be printed on a durable offset book paper which will take ink without running or blotting. The page size of the work will be 7 by 10 inches, which will insure wide margins around the type material.

It is planned also to issue a special reprint of the list with index, printed on one side of the page only, leaving every other page blank so that notes and additions can be added. A third special printing of this List, without index, will be run off on white cardboard, suitable for labels. These last two proposed reprintings will only be undertaken if there seems to be sufficient interest and demand to warrant the extra cost.

Dr. McDunnough has brought this list down to the end of 1937, incorporating all of the species added to the literature since the publication of the earlier list, and thoroughly revising the material to conform to them many excellent revisions of the various groups that have been issued by specialists. His own eminent standing as a systematist insures a work that will be indispensable to all who operate in the field of North American Lepidoptera.

Further details regarding the above may be obtained by writing Dr. John A. Comstock, Treas., So. Calif. Academy of Sciences, c/o Los Angeles Museum, Exposition Park, Los Angeles, Calif.—JOHN A. COMSTOCK.

A Substitute Name for Dicellura (Rehn and Hebard) (Orthoptera: Tettigoniidae.)

In 1915 in the Transactions of the American Entomological Society (XLI, pp. 158, 161, 169) we proposed the name *Dicellura* for a subgenus of the tettigoniid genus *Conocephalus*. An examination of generic name indices then available failed to show prior use of the name. However, it has recently been called to our attention that Halliday in 1865 (Journ. Linn. Soc. London, Zoology, VIII, p. 162) first used the name *Dicellura* for a new genus of Thysanura. To replace our preoccupied *Dicellura* we here propose *Dicellurina*, with the same genotypic species, i. e. *Conocephalus allardi* [*Xiphidion allardi*] (Caudell).—JAMES A. G. REHN and MORGAN HEBARD.

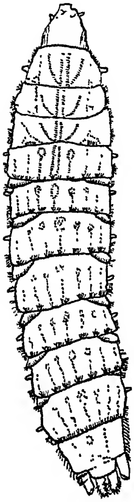

Fig. 1.

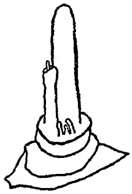

Fig. 2.

Fig. 3.

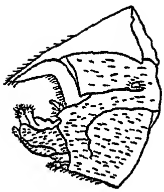

Fig. 4.

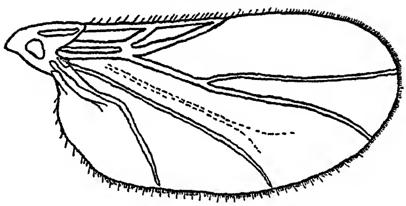

Fig. 5.

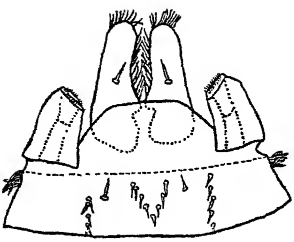

Fig. 6.

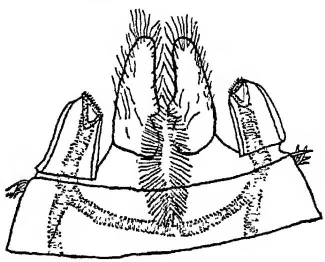

Fig. 7.

SCATOPSE (RHEGMOCLEMA) SIMILIS N. SP.—BEEKEY

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The Immature and Adult Stages of a New Species of Scatopse from Maine. (Diptera: Scatopsidae).

By Cyrus E. Beekey.

(Plate IV.)

Some flies which differ from previously described species but closely resembling *S. subnitens* Verrall (= *nigra* (Mg.) Edw.) an European species, were submitted to me by Dr. O. A. Johannsen of Cornell University. The larvae and pupae were found beneath the loose bark of spruce logs, which were floating in the Penobscot River, in the vicinity of saw mills, at Orono, Maine, in October. They occurred just above the water line where they were kept moist by the capillary action.

Scatopse (Rhegmoclema) similis n. sp.

Larva. Head capsule strongly sclerotized, flattened dorsoventrally, truncate, slightly longer than wide; surface generally smooth on top but laterally sculptured. Eyes absent. Antennae small, slender, with papillae-like blade or spike on the second segment (fig. 2). Labrum with groups of fine spines projecting from its under surface; premandibles with five distinct teeth, the fourth and fifth being finer and longer than the first three. Mandibles with four teeth in one plane, and one more proximad directed toward the others. The "leaf-like structure" found in some other species was not observed in *S. similis* but in its place were several long, stout bristles. Besides these there is a fringe of bristles extending about the distal third of the mandible on the dorso-lateral side. The maxilla is similar to that of other species, the distal lobes with blunt teeth.

Body composed of twelve segments, each of which, except the eleventh, more than twice as broad as long (fig. 1); dorsal side more strongly sclerotized than the ventral. First thoracic segment bears a lateral spiracle; first six abdominal segments are of uniform width; first abdominal segment apparently overlapping the third thoracic as well as the second abdominal, and somewhat bi-convex with reference to its anterior and pos-

terior margins. Each abdominal segment with a pair of lateral spiracles, except the eighth and ninth; those on the eighth abdominal segment project caudally, stout, and heavily sclerotized; ninth tergite projecting over the bases of stout caudal papillae (fig. 6).

The dorsal setae pattern of *S. similis* is quite characteristic (fig. 1). There is a median longitudinal row of bristles on all segments except eleven and twelve. This row is double on segments one to four inclusive and partly so on the fifth and sixth. On the thoracic segments there are two more rows of setae on each half; those next to the median row diverging anteriorly. The next row on the first two segments is almost parallel to the median row. It is joined by short, slightly curved, transverse rows. On the third segment the lateral longitudinal row also diverges from the posterior to the anterior margin. On segments four to ten inclusive, in addition to the median row, there are three rows in each dorsal half of a segment. Often the third row is considerably broken. These rows are nearly parallel with the median row. On the fourth segment the rows next to the median seem to have at their anterior ends small loops. These, although less regular, are found in a similar position on segments five to nine inclusive. On the sixth segment and those following, the median row of setae appears to have a small, more or less circular area of setae at the anterior end. The setae on the eleventh segment (fig. 6) roughly represent the letter "W" with the outer arms pointing anteriorly. The setae on this segment are longer and stronger than those previously described. On segments four to ten inclusive, there is, on the posterior border of each segment, a broken line of hairs connecting the posterior ends of the longitudinal row of bristles. This row is incomplete on the third segment. Segments five to ten inclusive also appear to have an anterior fold on the lateral margins of each segment. This is also lined with hairs slightly longer than the setae. Laterally, each segment except the first and last two, have two tufts of hairs, one anterior just in front of the spiracles, the other posterior. The first segment has the anterior lateral border margined with hairs and the eleventh segment has the entire lateral border thus margined, but with considerably longer hair. The setae, under very high magnification, appear like the teeth of a comb as there are often five or six very close together in a straight line. These are found especially on the median row, and on the lateral rows of the first four segments. Groups of fewer setae, of this type, are scattered without pattern on the ventral surface. The tubercles

of the posterior spiracles are stouter, and more heavily sclerotized than the caudal appendages. They are nearly parallel with them and bear only a few very tiny hairs, differing in this respect from some other described species, in which, the hairs are longer. In the larva of *S. atrata* described by Malloch in 1917 the spiracular tubercles appear on the dorsal side near the anterior border of the 12th segment. The caudal appendages in the latter species also appear on the dorsal side but near the posterior border of the 12th segment and diverge rather sharply. In the larva of *S. similis* the caudal appendages are slightly tapering, and covered at their tips and on their interior margins by very long hair. On the ventral surface the posterior spiracular tubercles clearly show the trachea entering them (fig. 7). There is a "V" shaped area on the eleventh and twelfth sternites which is bordered by a wide diffuse line of long hair. These hairs guard the anal opening. In other species this line is more regular. Length of full grown larva about 4.0 mm.

The *pupa* of *S. similis* is very similar to those of other members of the genus *Scatopse,* except in the structure of the prothoracic spiracular organs. The pupa forms within the last larval skin, and through this, one can observe on the ventral side, the sheaths for the appendages. On the dorsal side, however, projecting through the larval skin, in the third segment along the anterior margin, a pair of long "horn-like" processes break through. These are the prothoracic respiratory organs. In *S. subnitens* and also in *S. atrata* each of these organs bifurcates into equal parts about the middle of their length. The *S. similis* pupa as seen from some angles seems to have a straight unbranched organ, but, by turning it, one may notice a small branch near the middle containing a few tracheal openings (fig. 3). The remainder of the organ at its tip and on the distal half is closely covered by the spiracular openings, which appear as the ends of tiny tubes. Six pairs of lateral pupal respiratory processes are found which pierce the larval skin in the same line as the last abdominal pair. The pupal organs are longer than those of the larva.

♂ ♀. The adult of *S. similis* closely resembles that of *S. subnitens* Verr. except in a slight difference of wing structure. The wings of *S. subnitens* are described as being milky white. In *S. similis* they are transparent hyaline. The cubital veins more closely approach the wing margin in *S. similis* than in *S. subnitens.*

Length 2 mm. Head and body black, the latter glistening,

legs yellow to dark brown. Facets of eyes interspersed with short brown hairs. Antennae ten-segmented, slightly longer than the height of the head; distal segment is as long as the three adjacent segments; each segment bearing several bristles in addition to numerous fine hairs; the second segment longer than the first or third but of the same width as the remainder of the segments. Scutellum, black, with numerous yellow hair. Mesonotum very dark brown, glistening, with only a few hairs. Abdomen long and narrow, closely covered with a gray pubesence; slightly depressed dorsoventrally.

The male is easily distinguished by a somewhat pointed tergite at the tip of the abdomen. Beneath the claspers the last sternite projects in a rounded point (fig. 4). The female has light colored, haired lobes as in other species.

Wing (fig. 5) transparent hyaline; first three veins very heavy and black, ending at about the middle of the costal margin, the other veins very light in color; prefurca of median vein about one-half the length of either branch; first branch ends at the apex; both branches at first parallel but diverge rather sharply near the wing margin; first cubital vein extends beyond the half of the wing, where it suddenly bends toward the wing margin, but not quite attaining it; second cubital vein thick and strongly sinuous, having an arc of a small circle at its middle; second cubital vein, like the first, not quite reaching the wing margin and stopping abruptly very close to it; anal vein reduced. A pair of spurious veins appears between the media and cubitus, and after being closely parallel to the middle of the wing, diverge at an angle of about thirty degrees. Costal margin with stout bristles on the first two-thirds, beyond which point they gradually become finer, but interspersed with a few longer hairs beyond the point where the second branch of the media reaches the margin. Halteres very dark brown, almost black.

The adult *S. similis* most closely resembles *S. atrata* and *S. pygmaea* of the species previously described for North America, differing in the relative length of the prefurca. The prefurca in *S. atrata* is two-thirds of the length of the posterior branch of the median fork, in *S. similis* it is slightly less than half the length of the posterior fork, in *S. pygmaea* it is about one-fourth of the length of the posterior branch of the fork.

This is the unnamed species referred to by Johannsen in Aquatic Diptera, Part I, (Memoir 164, Cornell University Experiment Station, 1934, page 49).

Where and When to find the Orthoptera of Pennsylvania, with Notes on the Species Which in Distribution Reach Nearest This State.

By MORGAN HEBARD, Philadelphia, Pennsylvania.

(Continued from page 103.)

The following exotic species have been brought to Pennsylvania but can almost certainly not become established in this climate.

DERMAPTERA.

EUBORELLIA ANNULIPES (Lucas). Philadelphia, 1 ♂.

PROLABIA ARACHIDIS (Yersin). Dead in skin of bat in Philadelphia museum, 1 ♂, 2 juv.

ORTHOPTERA.

BLATTIDAE.

NEOBLATTELLA FRATERCULA (Saussure and Pictet). On ship at Philadelphia from Honduras, 1 ♂.

N. DETERSA (F. Walker). On ship at Philadelphia from Jamaica, 2 ♂, 5 ♀.

NYCTIBORA LAEVIGATA (Beauvois). On wharf at Philadelphia, 1 ♀. Harrisburg, 1 ♀.

EURYCOTIS DIMIDIATA (Bolivar). Berwick, 1 ♂.

NEOSTYLOPYGA RHOMBIFOLIA (Stoll). In package of tobacco from Sumatra at Reading, 1 ♀.

PANCHLORA CUBENSIS Saussure. In fruit at Philadelphia, 3 ♀.

LEUCOPHAEA MADERAE (Fabricius). In logwood on ship at Philadelphia from Jamaica, 1 large juv.

NAUPHOETA CINEREA Olivier. In onion leaves on ship at Philadelphia from Rhodesian cargo, 1 ♂, 2 ♀.

BLABERUS DISCOIDALIS Serville. In logwood on ship at Philadelphia from Jamaica, 1 ♂, 3 ♀.

The following species, not known from New Jersey or Pennsylvania, probably do not occur in the latter State but in distribution approach it relatively closely.

ACRIDIDAE.

SCHISTOCERCA OBSCURA (Fabricius). Dover, Delaware; Chestertown and Druid Hill Park in Baltimore, Maryland. In high rich vegetation in humid areas. Most adults in Fall.

PARATYLOTROPIDIA BEUTENMULLERI Morse. In southern valleys of Appalachian Mountains. Probably in thicket undergrowth. Adult probably in early Summer.

MELANOPLUS ACROPHILUS PACHYCERUS Hebard. Giles County, Virginia at 4000 feet. Probably in richer open forest undergrowth. Adult probably in early July.

PAROXYA HOOSIERI Blatchley. Lake and Portage Counties, Ohio (E. S. Thomas). In bogs. Adult in mid-July.

TETTIGONIIDAE.

MONTEZUMINA MODESTA (Brunner). Wingina, Virginia. In bushes and forest undergrowth. Adult probably in mid-July.

ATLANTICUS AMERICANUS HESPERUS Hebard. Berne Township in Fairfield County, Ohio (E. S. Thomas). In woodland undergrowth. Adult in early July.

GRYLLIDAE.

NEMOBIUS GRISEUS GRISEUS E. M. Walker. North Haven, Connecticut, and Lucas County, Ohio (E. S. Thomas). In sandy areas in open. Adult in mid-August.

N. CONFUSUS Blatchley. Plummers Island and Cabin John Run, Maryland. In bogs and swamps. Adult in mid-August.

CYRTOXIPHA COLUMBIANA Caudell. Washington, D. C. In the lower foliage of deciduous trees. Probably adult in early August.

The following species reach to or beyond New Jersey on the Atlantic Coast but in this latitude are not known, and the great majority certainly do not occur, inland as far as Pennsylvania.

DERMAPTERA.

PSALIDAE.

ANISOLABIS MARITIMA (Géné). Sea beaches from Maine to Florida. Adult at all seasons in the South.

ORTHOPTERA.

BLATTIDAE.

PARCOBLATTA FULVESCENS (Saussure and Zehntner). Coastal margin of Pine Barrens north to Lakehurst. Adult in mid-June.

P. CAUDELLI Hebard. Costal margin of Pine Barrens north to Wading River on Long Island, New York. Adult in mid-June.

P. LATA (Brunner). Ocean View, VII, 24 and VIII, 10, 1937, (H. Fox; taken in molasses jar trap set in woods) 3 ♀ 2 juv., [A.N.S.P. and Hebard Cln.]. A first record for New Jersey and a northern limital point.

ACRIDIDAE.

TETTIGIDEA ACUTA Morse. Salt marshes north to Morgan. Adult in Spring, Summer and Fall.

Although there is a recorded male of *Tettigidea prorsa* Scudder labelled Beach Haven, New Jersey in the Academy collection, it is apparent that some mistake in labelling may have occurred. The correct limit of known northeastern distribution may well be Fayetteville, North Carolina.

MERMIRIA INTERTEXTA Scudder. Bog areas and margins of tidal marshes north to Ocean City and Belleplain in southern New Jersey. Adult early in August.

ORPHULELLA OLIVACEA Morse. Salt marshes generally, north to New Haven, Connecticut. Adult in late June.

CLINOCEPHALUS ELEGANS Morse. Margins of salt marshes and bogs near coast north to Ravenswood on Long Island, New York. Adult in mid-July.

PARDALOPHORA PHOENICOPTERA (Burmeister). Sandy waste fields toward coast throughout New Jersey, north to Fort Wadsworth on Staten Island, New York. Adult in early June.

SPHARAGEMON SAXATILE Morse. On bare rock ledges southwest to Great Notch, Newfoundland and Ogdensburg in northeastern New Jersey. Adult in early July.

MELANOPLUS IMPUDICUS Scudder. Pine Barrens north to Selden on Long Island, New York. Berlin, New Jersey is the

eastern limit nearest Pennsylvania. Adult in early June.

M. STONEI Rehn. Even more local in Pine Barrens north to Lakehurst. Berlin is the eastern limit nearest Pennsylvania. Adult in late June.

DENDROTETTIX QUERCUS Packard. A unique relict or introduced. Present in northern Pine Barrens of New Jersey and north to Yaphank on Long Island, New York. On oaks, not infrequently defoliating these trees. Adult in mid-July.

PAROXYA ATLANTICA ATLANTICA Scudder. Edges of marshes on coast and in swamps and bogs of Pine Barrens north to Jamesburg and Lakehurst. Medford and Lindenwold are eastern limits nearest Pennsylvania. Adult in late June.

TETTIGONIIDAE.

MICROCENTRUM RETINERVE (Burmeister). In deciduous trees. North only to Manumuskin in southern New Jersey. Adult in mid-August.

NEOCONOCEPHALUS TRIOPS (Linnaeus). Through undergrowth. North only to Green Creek in extreme southern New Jersey. Adult in late August, so surviving and reappearing in early Spring in the South.

N. ROBUSTUS ROBUSTUS (Scudder). Sea beaches north to Cape Cod, Massachusetts. Adult in late July.

N. NEBRASCENSIS (Bruner). Ocean View. Otherwise known only from the middle west. Adult taken early in August.

ORCHELIMUM FIDICINIUM Rehn and Hebard. Salt marshes north to Rockaway on Long Island, New York and on Delaware Bay to Hancock's Bridge. Adult in mid-July.

O. MILITARE Rehn and Hebard. Speedwell, one very small male. Extremely rare so far north. Tall grasses in damp spots in pine woods and along borders of marshes and lakes. Adult taken in late August.

CONOCEPHALUS STICTOMERUS Rehn and Hebard. Fresh water marshes in southern New Jersey north only to Cedar Springs. Adult in early August.

C. AIGIALUS Rehn and Hebard. Northern limit Cape May (series secured last Fall by H. Fox). On damp soil in *Spartina patens*. Adult probably in early August.

C. NIGROPLEUROIDES (Fox). Salt marsh tidal flats north to Staten Island, New York, in *Spartina stricta* and *Spartina patens*. Adult in late July.

C. SPARTINAE (Fox). Salt marshes north to Old Orchard, Maine, in *Panicularia fluitans* and *Spartina patens*. Adult in late July.

GRYLLIDAE.

ANUROGRYLLUS MUTICUS (DeGeer). Coastal southern New Jersey north only to Ocean View. Adults present early in June.

NEMOBIUS CUBENSIS CUBENSIS Saussure. Coastal in marshes north to Staten Island, New York. Swainton and Cold Spring only New Jersey localities.

FALCICULA HEBARDI Rehn. Known only from Reega. A northern limit in the Pine Barrens. Adults taken in late July.

CYCLOPTILUM BIDENS Hebard. Coastal north to East Marion, Long Island, New York. Lakehurst, Margate City and Reega are the only New Jersey records. Adult in mid-August.

GRYLLOTALPA GRYLLOTALPA (Linnaeus). Introduced and established; in great numbers in nursery at Rutherford.

It will be noted how very much E. S. Thomas has helped me in defining limits of distribution. Through an unfortunate error the initials E. R. instead of E. S. Thomas were given on page 37. Under *Scudderia fasciata*, moreover, on page 33, I should have remarked that the specific status of that insect had been observed by E. S. Thomas from Ohio material and that he had communicated to me his findings.

Notes on the Synonymy and Distribution of some North American Bees of the Genus Bombomelecta (Hymenoptera).

By E. Gorton Linsley, University of California, Berkeley.

The bees of the genus *Bombomelecta,* although occasionally captured in numbers, are generally rather rare in collections. Little is known of the distribution or hosts of most of the species, and in several cases, sexual dimorphism has resulted in the giving of different specific names to the two sexes of a single species. The following notes and synonymy are based primarily on a study of the members of the genus in the collections of the Academy of Natural Sciences of Philadelphia, the California Academy of Sciences, and the Canadian National collection.

Bombomelecta fulvida (Cresson). This form has been variously treated by different authors as a distinct species or as a variety of *B. pacifica* Cresson or *B. thoracica* Cresson. The male genitalia indicate that its relationships are with *pacifica,* but the lobes of the stipites have a more slender, conical, apical process than in the latter type. At present our knowledge of the habits and distribution of the two forms is insufficient to indicate whether this difference is of specific or subspecific importance. *B. fulvida* has been recorded from Nevada (type locality), Colorado, Arizona, New Mexico, and British Columbia. Additional records are as follows: California: Truckee, June 13-15 (Van Duzee, C. A. S.), West Walker River, Mono Co., 7200 ft. (N. W. Frazier), Hackamore, Modoc Co., May 6 (Linsley); Oregon: Warner Mts., Lake Co., June 19 (Van Dyke, C. A. S.), Blitzen Valley, Harney Co., April 19 (S. G. Jewett), Stein Mts., Harney Co., June 25 (W. J. Chamberlin, C. A. S.), Melhorn's Mill, Baker Co., June 17 (W. J. Chamberlin, C. A. S.), Wild Horse Canyon, Steens Mts., July 5 (Scullen, C. A. S.), Meachim, June 23 (J. F. Bock, C. A. S.), Elgin, June 20, (A. L Lovett, C. A. S.); British Columbia: Penticton, April 25-30 (E. R. Buckell, Can.), Chilcotin, May 14 (Buckell, Can.), Salmon Arm, April 25, (T. Wilson, Can.), Vernon, May 25 (W. B. Anderson, Can.); Alberta: Medicine Hat, April 21 (Sladen, Can.); Utah: Mt. Carmel, near Zion Canyon, May 23, (Van

Dyke, C. A. S.); TEXAS: Davis Mts., July-August (Poling), Texas A. & M. College Insectary (C. A. S.)

BOMBOMELECTA LARREAE Cockerell.

Bombomelecta larreae Cockerell, 1900, Can. Ent. 32:51, ♀.

Bombomelecta azygos Viereck, 1903, Trans. Am. Ent. Soc. 29: 181, ♂, n. syn.

An examination of the type of *B. azygos* Viereck reveals the fact that it is the male of *B. larreae* Ckll. The two sexes are quite similar, but the male lacks the dense patch of golden hairs on the upper frons as well as the abdominal fasciae which are sometimes present in the female. The species has been previously known from New Mexico (*larreae*) and Nevada (*azygos*). In California, a series of both sexes was recently taken near the junction of Deep Creek and the Mojave River, Mojave Desert, San Bernardino Co., on April 26 (Linsley) and May 5 (Timberlake and Linsley), at flowers of *Eriodictyon trichocalyx*. Other records from the same State are: Borego Valley, San Diego County, May (H. S. Gentry, in coll. G. E. and R. M. Bohart); Wildrose Canyon, Panamint Mts., Inyo County, 3500 ft., May 28, on *Prosopis* (C. D. Michener); 5 mi. C. of Olancha, Inyo Co., May 19 (C. D. Michener); and Mountain Springs, Argus Mts., Inyo Co., 5000 ft., May 22, on *Stenotopsis linearifolia* and *Stanleya pinnata* (C. D. Michener).

BOMBOMELECTA EDWARDSI (Cresson).

Melecta edwardsi Cresson, 1878, Trans. Am. Ent. Soc. 7:92, ♂

Bombomelecta zygos Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♀

A study of the type of *B. zygos* Viereck confirms the suggestion of Dr. Cockerell[1] that it is the female of *B. edwardsi* Cresson. The two sexes have been taken together on numerous occasions at Antioch, Contra Costa Co., Calif.

BOMBOMELECTA PACIFICA Cresson. British Columbia records in the Canadian National Collection are as follows: Vernon (E. P. Venable), Penticton, April 10-15 (E. R. Buckell), Salmon Arm, April 25 (T. Wilson).

BOMBOMELECTA SEPARATA MACULATA Viereck. This race has been previously recorded from Utah, California, and

[1] Cockerell, T. D. A., 1925, Pan-Pac. Ent. 1:180.

Oregon. Material in the Canadian National Collection from British Columbia is as follows: Victoria, April 29 (R. C. Treherne), and Royal Oak, May 5 (R. C. Treherne).

Bibliographical and Synonymical Catalogue of Bombomelecta.

Genus BOMBOMELECTA Patton.

Bombomelecta Patton, 1879, Bull. U. S. Geol. Surv. 5:370. Cresson, 1887, Trans. Am. Ent. Soc. (suppl.) 128. Fox, 1893, Ent. News 4:144. Ashmead, 1899, Trans. Am. Ent. Soc. 26:66. Fowler, 1901, Univ. Calif. Exp. Sta. 2:326. Cockerell and Atkins, 1902, Ann. Mag. Nat. Hist. (7) 10:46. Cockerell, 1910, Ann. Mag. Nat. Hist. (8) 5:27. Cockerell. 1928, Univ. Colo. Studies 16:104.

Orthotype: *Melecta thoracica* Cresson.

ALFREDI Cockerell, 1895, Psyche (suppl.) 11, ♂. Cockerell, 1898, Bull. Lab. Den. Univ. 11:61, ♂. Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♂. N. Mex.

ARIZONICA Cockerell, 1902, Can. Ent. 34:267, ♀. Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♀. Ariz.

CALLURA Cockerell, 1926, Pan-Pac. Ent. 3:58, ♂. Calif.

EDWARDSI Cresson, 1878, Trans. Am. Ent. Soc. 7:92, ♂, *Melecta*. Fowler, 1901, Univ. Calif. Exp. Sta. 2:326. Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♂. Cockerell, 1925, Pan-Pac. Ent. 1:180, ♂. ♀. Calif.

zygos Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♀.

FULVIDA Cresson, 1878, Trans. Am. Ent. Soc. 7:204, ♀, *Melecta pacifica* var. Cockerell, 1895, Psyche (suppl.) 11, *Melecta thoracica* var. Cockerell, 1898, Bull. Lab. Den. Univ. 11:61, *M. thoracica* var. Viereck, 1903. Trans. Am. Ent. Soc. 29:179, ♀. Cockerell, 1908, Ann. Mag. Hist. (8) 2:331, *M. pacifica* var. Viereck, 1906, Can. Ent. 38: 278, ♀. Cockerell, 1908, Ann. Mag. Hist. (8) 2:331, *M. pacifica* var. Cockerell, 1928, Univ. Colo. Studies 16:104. Calif. Nev., Ore., B. C., Alta., Utah, Colo., Ariz., Tex., N. Mex.

JOHNSONI Cockerell, 1905, Ent. News 16:270, ♂. Cockerell, 1928, Univ. Colo. Studies 16:104. Colo.

LARREAE Cockerell, 1900, Can. Ent. 32:361, ♀. Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♀. N. Mex., Nev., Calif.

azygos Viereck, 1903, Trans. Am. Ent. Soc. 29:181, ♂.

MACULATA Viereck, 1903, Trans. Am. Ent. Soc. 29:181, ♀, *B. separata* var. Viereck, 1906, Can. Ent. 38:278, ♀, *B. separata* var. Cockerell, 1916, Pomona Journ. Ent. Zool. 8:61. Utah, Calif., Ore., B. C.

PACIFICA Cresson, 1878, Trans. Am. Ent. Soc. 7:91, ♂, *Melecta*. Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♀ ♂. Viereck, 1906, Can. Ent. 38:278, ♀ ♂. Swenk, 1907, Ent. News 18:298. Cockerell, 1928, Univ. Colo. Studies 16:104. Calif., Nev., Colo., Nebr., B. C.

SEMIFULVA Cockerell, 1921, Ann. Mag. Nat. Hist. (9) 7:212, ♂. Cockerell, 1928, Univ. Colo. Studies 16:104. Colo.

SEPARATA Cresson, 1878, Trans. Am. Ent. Soc. 7:204, ♀, *Melecta*. Fowler, 1901, Univ. Calif. Exp. Sta. 2:326. Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♀. Nev., Calif.

THORACICA Cresson, 1875, Wheeler Exp. 1:726, ♀, *Melecta*. Patton, 1879, Bull. U. S. Geol. Surv. 5:370. Ashmead, 1890, Bull. Colo. Biol. Assn. 1:30. Fowler, 1901, Univ. Calif. Exp. Sta. 2:326. Viereck, 1903, Trans. Am. Ent. Soc. 29:179, ♀. Nev., Calif., Tex., Colo.

Some Dragonflies from the Florida Keys (Odonata).

By C. FRANCIS BYERS, University of Florida, Gainesville.

During the past year the writer has received two small collections of dragonflies from some of the islands or "keys" off the southern tip of peninsular Florida.

One of these collections, made by Mr. Frank N. Young on Virginia Key near Miami (Dade County, Florida), contained a male specimen of *Trapezostigma binotata* (Rambur)* captured June 18, 1937. Mr. Young reports that this specimen was taken flying against the wind along a canal and that capture was difficult due to the height and speed at which the dragonfly was flying. He also states that other representatives of the species were seen but not captured.

The other collection received was made by Mr. Jack C. Russell on Key West and the Dry Tortugas from July 2 to August 12, 1936.

The Dry Tortugas, southernmost part of the United States, consists of a group of small low lying keys located 65 miles from Key West and 125 miles west-southwest from Cape Sable,

* Syn. ad. *Tramea insularis* Hagen. The generic name *Tramea* Hagen, 1861, must be replaced by *Trapezostigma* Hagen, 1849, according to Mr. J. Cowley. (Nomenclature of Odonata: Three Generic Names of Hagen. The Entomologist, 68:283-284, December, 1935). Hagen's species *insularis* is a synonym of Rambur's *binotata*.

at the entrance to the Gulf of Mexico. The nearest mainland is Cape Sable; the island of Cuba at its nearest point is 90 miles distant; the coast of Yucatan is 350 miles to the southwest and 750 miles to the westward is the coast of Mexico.

Mr. Russell collected dragonflies on the following keys of the Tortugas group: Garden Key, the largest of the group on which Fort Jefferson is located; Loggerhead Key, the location of the lighthouse and the Marine Biological Laboratory of the Carnegie Institute of Washington; Bush Key and Sand Key.

Because of its interest to students of dragonfly distribution and to biologists concerned with the fauna of the Dry Tortugas, I append a complete list of Mr. Russell's dragonfly collection; the notes following the species are his.

CORYPHAESCHNA INGENS (Rambur). 1 ♀. Loggerhead Key, August 3, 10 P. M. Party cloudy with showers. Perched on limbs of bushes.

C. VIRENS (Rambur). 1 ♀. Bush Key, August 2, 6:30 P. M. Fair. Caught flying around a brackish water pool.

TRIACANTHAGYNA TRIFIDA (Rambur). 1 ♀. Loggerhead Key, August 3, 10 P. M. Partly cloudy with showers. Perched on limbs of bushes.

ANAX AMAZILI (Burmeister). 1 ♀. Garden Key, July 2. Fair. 1 ♂. Garden Key, July 16. At rest at night.

A. JUNIUS (Drury). 1 ♀. Loggerhead Key, July 30, 8:30 P. M. Windy and partly cloudy. Perched on limbs of bushes. 1 ♂ ; 2 ♀. Loggerhead Key, August 3, 10:00 P. M. Partly cloudy with showers. Perched on limbs of bushes.

CELITHEMIS EPONINA (Drury). 1 ♀. Garden Key, July 7.

ORTHEMIS FERRUGINEA (Fabricius). 3 ♀. Key West August 8-9, Mid-day. Fair. Flying around a fish pool.

ERYTHRODIPLAX BERENICE NAEVA (Hagen). 1 ♂. Garden Key, July 23. Windy and partly fair. Hanging around a slightly brackish pond—an enclosed place in the moat. 3 ♂ ; 1 ♀. Key West, August 7-8. Fair. Open grassy field. 1 ♂ ; 6 ♀. Key West, August 10. Hot and fair. Around brackish water.

E. UMBRATA (Linne). 2 ♀ (heterochromatic). Garden

Key, July 26. Flying after a storm. 1 ♂ ; 1 ♀ (homochromatic). Bush Key, July 27. Windy.

PACHYDIPLAX LONGIPENNIS (Burmeister). 1 ♂. Garden Key, July 26. Flying after a storm.

LEPTHEMIS VESICULOSA (Fabricius). 1 ♂. Loggerhead Key, July 30. Fair. 1 ♂. Key West, August 9. Mid-day. Fair. Around fish pool. 2 ♂. Key West, August 10. Hot and Fair. Around brackish water flats.

MACRODIPLAX BALTEATA (Hagen). 1 ♂ ; 1 ♀. Key West, August 10. Hot and Fair. Around brackish water flats.

TRAPEZOSTIGMA CAROLINA (Linne). (See foot note, page 163). 3 ♀. Garden Key, July 7.

PANATALA FLAVESCENS (Fabricius). 1 ♀. Garden Key, July 7. 1 ♀. Loggerhead Key, July 24. Fair. 2 ♂ ; 1 ♀. Garden Key, July 30. Early morning after a hard blow and rain.

P. HYMENAEA (Say). 2 ♀. Garden Key, July 7. 1 ♀. Garden Key, July 30. Early morning after a hard blow and rain.

ISCHNURA RAMBURII (Selys). 1 ♀. Sand Key, July 14. 2 ♂ ; 2 ♀. Bush Key, July 18. Fair. 2 ♂ ; 2 ♀. Bush Key, August 2. Fair. Flying around brackish water pool. 2 ♂ ; 3 ♀. Loggerhead Key, August 3. Hot and fair. Caught by sweeping in grassy field.

ANOMALAGRION HASTATUM (Say). 2 ♀. Loggerhead Key, July 30. 1 ♂ ; 1 ♀. Garden Key, August 2. Fair. Flying in Ft. Jefferson. 1 ♂ ; 2 ♀. Key West, August 12. Hot and fair. Open grassy fields.

Coryphaeschna virens, Anax amazili and *Trapezostigma binotata* are worthy of special note because either they are new additions to the Florida list of dragonflies or they substantiate literature records made so long ago as to be traditional. Also, it is of interest to point out the prevalence of the larger stronger flying dragonflies on the Dry Tortugas and the paucity of the damselfly fauna.

Five New Genera of Fossil Oestromuscaria. (Diptera).

By Charles H. T. Townsend, S. Paulo, Brazil.

ADIPTERITES gen. nov.

Genotype, *Dipterites obovatus* Heer, Urwelt Schweiz, fig. 323 (1865). Maggot. Upper Miocene of Oeningen, Baden.

Length, 24 mm; width, 18 mm. Oval, showing 13 segments, venter of second to twelfth but especially second to tenth segments furnished with heavy armature and chitinized in what appear like segmental plates, dorsum unarmed. Evidently cuterebrid or hypodermatid stock, but unlike any form hitherto known.

COCKERELLITHA gen. nov.

Genotype, *Glossina osborni* Cockerell, Nature, April, 128 (1909). Fly. Miocene of Florissant, Colorado.

Length of body, 10-1/3 mm; wing, 7 mm. M2 not so strongly curved before R6 as in Paloestrus and the living glossinid genera, M3 axis at right angle to M2, being the opposite extreme in venation from Lithoglossina erected below.

LITHOGLOSSINA gen. nov.

Genotype, *Glossina armatipes* Cockerell, Pr. Biol. Soc. Wash., XXX, 19 (1917). Male fly. Miocene of Florissant, Colorado.

Length of abdomen, 6½ mm; wing, 7½ mm; hind femur, 4 mm; hind tibia, 3 mm. M3 strongly sinuate, its axis at 45° to M2. Hind femora and tibiae armed with row of strong bristles, hind metatarsi bearing 2 stout longitudinally striate spines. Quite in contrast to other glossinid genera, which show hind legs only faintly bristled and M3 only faintly sinuate.

ELECTROTACHINA gen. nov.

Genotype, **E. smithii** sp. nov. For new genus Muscidae aff. Tachina sp. F. Smith, Quart. Jn. Sc., V, 184, pl. 18, fig. 5 (1868). Fly Lower Oligocene of Baltic amber.

Length of body, 8 mm; wing, 7 mm. Body not stout. Wings much longer than abdomen, 5R apparently narrowly open or closed, M3 apparently nearer R6. Legs moderate length. Abdomen apparently ovate and rather deep. Probably exoristid or tachinid stock.

VINCULOMUSCA gen. nov.

Genotype, *Musca vinculata* Scudder, Bull. U. S. G. G. Sur.

Terr., III, 758 (1877); Tert. Ins. No. Am., 554, pl. 5, fig. 77 (1890). Maggot. White River. Eocene of Chagrin Valley, Colorado.

Length, 17 mm; width, 4½ mm. Stout subcylindric, venter with broad transverse micro spine bands best marked on fourth to ninth segments. Apparently exoristid or tachinid stock.

Notes on the Distribution of Vermileo in the United States and Mexico with a Description of a New Species. (Diptera: Rhagionidae).

By DONALD DELEON, Berkeley, California.

The genus *Vermileo,* or worm-lions as they are commonly called, includes a group of true flies of very remarkable habits. It seems, however, that both the latin name and the commonly used translated equivalent are misleading, for in habits they are not lion-like insects that feed on "worms" but "worms" or better maggots with the habit of preying on small arthropods that fall into their pits in the sand or dust. Their mode of life is quite similar to that of *Myrmeleon* which, as the name indicates, includes a group of predatory insects feeding chiefly on ants.

Wheeler[1] gives an account of the habits and distribution of all the known species of this genus and in addition a detailed study of the morphology of that common species of the Sierra Nevada Mountains, *V. comstocki Wh.* It was believed by Wheeler that this species was a mountain form and found only at elevations above 4000 feet. In April 1934 the writer reared specimens of this species from material collected in February in the Coast Range at Pinnacles National Monument at an elevation of about 1600 feet. The Pinnacles National Monument is near Hollister, California. On December 22, 1936, Ranger Powell of this monument sent in about a dozen more larvae from this locality. Three of these larvae pupated and transformed between February 2 and March 1, 1937.

[1] Wheeler, W. M. Demons of the dust. W. W. Norton, New York, 1930.

V. opacus (Coq.) which is treated by Leonard[2] as a species distinct from *comstocki* and by Wheeler, in the work cited above, as but tentatively distinct was collected in the larval stage in numbers at Zion National Park, Utah in March 1934. Specimens reared from this lot were compared with the two specimens in the Academy of Natural Sciences, Philadelphia by Mr. Cresson who determined them as *V. opacus.* This species, which hitherto has been known only from a specimen collected near Carson City, Nevada and from two specimens from Alamogordo, New Mexico, was found to be very common in parts of the Southwest. In addition to the Utah locality, adults have been reared from larvae collected in Mesa Verde National Park, Colorado and Bandelier National Monument, New Mexico. Larvae that were most probably this species were collected at Colorado National Monument, Colorado and near Glendale, Utah. None has been collected in Arizona though they have been searched for from Grand Canyon in the north to the Chiricahua Mountains in the south.

V. opacus is easily distinguished from *comstocki* by its lighter color and its highly polished mesonotum with its three dark brown, sclerotized stripes.

During a trip to Mexico in 1936, *Vermileo* larvae were collected on January 25 at La Gruta near the pyramids of San Juan Teotihuacan at an elevation of about 8000 feet; on February 4 near the village of Palo Blanco, Go. at an elevation of about 2200 feet and on the same day at the same elevation two miles north of the town of Chilpanzingo, Guerrero. Both of these towns are on the highway to Acapulco. The last lot of larvae was collected on February 5 just south of the divide on the road between Mexico D. F. and Cuernavaca, Mor. at an elevation of about 9500 feet.

Of the several dozen larvae which were brought back alive to Berkeley only two have so far been reared to adults. Both of these larvae were from the lot collected February 5. At the time of collection these larvae were of all sizes but most of

[2] Leonard, M. D. A revision of the dipterous family Rhagionidae in the United States and Canada. Amer. Ent. Soc. Mem. 7. Philadelphia, 1930.

them were about 16 mm in length. Many of the larger larvae were taken from pits no larger than pits from which larvae half their size were taken. The largest larvae, four of which pupated between April 13 and 23, 1936, did not increase in size before pupation. One of these pupae transformed between April 24 and 25. The remaining three pupae died. One more adult, a male, emerged between March 5 and July 2, 1937. The date of pupation for this specimen is not known.

At the time of writing this note (November 10, 1937), there are four larvae still alive. Three of these are from the lot collected from La Gruta and one from the lot collected near Palo Blanco.

The larvae have been fed chiefly on vestigial-winged *Drosophila* adults but they also accepted termite nymphs and adults, ants, and even *Lucilia* larvae. The ability of the larvae to go without food or moisture is rather remarkable. Although between April 26 and November 20, 1936 none of the larvae was fed, there was only a slight mortality. In fact mortality seemed to be greater during the period when they were regularly fed than when they were not fed. Another record of a long fast is that of a larva from Pinnacles National Monument which was not fed during the period between June 1934 and January 25, 1935 but which was apparently healthy when fed on the later date. Signs of cannibalism were observed in only one box where the larvae were rather perhaps too closely crowded. In attempts to secure pupation, the sand containing the larvae was heavily misted with water several times but the moistening of the sand apparently had no effect in hastening their development.

The two adults that were reared appear to be a new species. They are strikingly distinct from either of the two species in the United States and do not fit the description for *Arthrostylum* described by Williston from Mexico[3]. Williston in Biologia Centrali-Americana[4] lists his species as a synonym of Walker's *Pheneus tibialis* which was described from Jamaica.

[3] Williston, S. W. Kans. Uni. Quart. Vol. 4, p. 109. 1895. (*A fascipennis* n. sp.).

[4] Diptera Vol. 1, p. 264 of supplement. 1886-1901.

As pointed out by Wheeler (op. cit.), Williston's description of *fascipennis* does not fit the description for *tibialis*. His species is more closely allied to the new species described below.

Vermileo willetti n. sp.

Male.—Length, 8 mm with abdomen bent downward. If straightened out the length would be about 8.5 mm. Head: Front and face both grey-pollinose; eyes dichoptic, black, bare rather finely granular, inner margin of compound eyes along front nearly parallel up to vertex, ocelli set on a distinct prominence which is narrowed and shining behind and below, lateral ocelli closer to inner margin of compound eyes than the width of the anterior ocellus; antennae with first joint yellow, twice the length of the second which is slightly darker than the first, basal part of the third joint same color as the second, remainder of third joint and style dark brown, nearly black, the style becoming darker towards its extremity; occiput flat, same color as front and face, rather sparsely covered with slender, yellowish-brown bristles; mouthparts light yellow.

Thorax: Somewhat opaque; mesonotum brownish-yellow with three black, longitudinal stripes somewhat confluent posteriorly, the middle stripe undivided, extending to the anterior margin, the lateral stripes extending slightly more than three-fourths of the way to the anterior margin, area between stripes grey-pollinose; scutellum yellowish-brown, metanotum similar but with median part dark brown, this brown part wider posteriorly than anteriorly; meso- and sternopleura dark brown; basal part of pteropleura dark brown, remainder of pleura yellow-brown; pleura for the most part slightly pollinose.

Abdomen: Slender, narrowest at segments 4 and 5, shining, yellowish brown with caudal half of segments 2 to 6 black, segment 7 entirely black, the remaining segment and appendages opaque brown, segment 1 black along crescent-shaped posteriorly bent transverse ridge, segment 2 with rounded boss near dorsal caudal margin, segment 3 with less strongly pronounced boss in the same relative position.

Wings: Hyaline with infumated band extending from C at union of Sc with C more narrowly across wing to and along Cu_2 to wing margin; all of cells C_2 and Sc infumated but not as strongly as transverse band; tip of wing infumated in region of R_{2+3} and R_4 and R_5; cell M_1 acute at base, cell M_3 open; knobs of halteres and distal half of stem nearly black.

Legs: Fore-legs yellow, last four segments of tarsi dark, 1st tarsal segment intermediate in color; a single spur present at

distal end of tibia; mesothoracic legs similar to fore-legs but darker in color and two spurs at end of tibia; metathoracic legs much longer than others and darker, tibia nearly black except for extreme proximal end of which is yellowish, two spurs at distal end of tibia.

Described from one specimen reared from larva collected February 5, 1936 along the highway about halfway between Mexico D. F. and Cuernavaca, Morelos. Emerged between March 5 and July 2, 1937.

Female.—Length 7 mm, the abdomen is bent down rather strongly; if straightened out the length would be at least 8 mm; similar to male but more robust and coloration uniformly lighter; inner margin of compound eyes along front more distinctly divergent towards the apex, lateral ocelli scarcely more distant from inner margin of compound eyes than the width of the anterior ocellus; mesothorax with longitudinal stripes wider, sides parallel and no tendency towards posterior confluency, lateral stripes lighter in color than median stripe; metanotum without darker median area; abdomen robust, dark yellow-brown, segments scarcely lighter anteriorly; hind tarsi and distal end of tibiae yellow; infumation of wings similar to but not as pronounced as in male.

Described from one female collected as larva same date and locality as male but which emerged between April 24 and 25, 1936. The tip of the right wing is broken.

Type: Male; both type and allotype are being retained in the author's collection under the collection number 680.

Named after C. R. Willette of Yosemite National Park who first found the pits of this species.

This species seems to be allied to *V. fascipennis* (Will.) but differs from it by the front and face being grey-pollinose whereas the front of *fascipennis* is brown and the face opaque yellow; by the first two joints of the antennae being yellow, while in *fascipennis* they both are partly black; by the pleura being yellow-brown instead of black; and by the abdomen having five transverse yellowish bands instead of being reddish and without any bands.

Acknowledgements are made to Mr. E. T. Cresson Jr., who kindly compared the material sent to him with the specimens in the Academy of Natural Sciences and to Dr. Nathan Banks who compared the male of the species described above with *V. tibialis* and *V. tibalis* var. *dowi* Wh. in the Museum of Comparative Zoology at Harvard.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society. Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, Sao Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista. Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or last year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Burr, M.—Beelzebub. [21] 50: 27-28. **Chapin, E. A.**—Collecting insects on Island of Jamaica. [Expl. & Field Work Smiths. Inst.] 1937: 73-76, ill. **Dallas, E. D.**—Dr. Eduardo Ladislao Holmberg, una pagina de la historia de la Sociedad Entomological Argentina. [104] 9: 135-137. **Dow, R.**—The Scudder drawings. [Bull. N. Eng. Mus. Nat. Hist.] 87: 12-13, ill. **Eustis, G. D.**—Obituary. By F. M. Jones. [Bull. N. Eng. Mus. Nat. Hist.] 87: 14-15. **Fletcher, T. B.**—More about Names. [21] 50: Suppl., (9)-(12). **Glaser, R. W.**—A method for the sterile culture of houseflies. [Journ. Parasit.] 24: 177-179. **Hansen, H. J.**—Obituary by K. L. Henriksen. [102] 20: 29-31, ill. **Hardy & Milne.**—Aerial drift of insects. [31] 141: 602-603. **Henriksen, K. L.**—Insects collected in the fifth Thule expedition. [Rep. Fifth Thule Exp. Copenhagen] Zool. II. 34pp., map. **Hora, S. L.**—Animal ecology of torrential streams. [Current Sci.] 7: 437-439. **Janse, A. J. T.**—Demonstration on the importance of the study of genitalia in lepidoptera for classification purpose. [S. Afri. Biol. Soc.] Pamp. 9: 26-27. **Kusnezov, N. J.**—The arctic fauna of Eurasia and its origin; a study based mainly on Lepidoptera (Russian, English summary.) [Trav. Inst. Zool. Acad. Sci USSR] 5: 1-85. **Lagloire & Gauthier.**—Le guide de l'amateur d'insectes. [98] 65: 78-86; 103-124, ill. (k.). **Lizer y Trelles, C. A.**—La obra entomologica de Don Carlos Bruch. [104] 9:13-21. **McDonald, M.**—A study of drouth recovery and

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The Late Samuel E. Cassino and The Naturalists' Directory

We regret to announce the death of Mr. Samuel E. Cassino on the 16th of November, 1937, at the age of 83 years. During his life he published 30 editions of the Naturalists' Directory and up to a few weeks of the end he was working on the 31st edition which he had expected to publish about this time.

It is planned by the writer to finish his work on this edition and publish it as soon as possible but the actual date is problematical as there is a great deal of work that must be finished before the Directory can be completed.

EST. OF SAMUEL E. CASSINO.

ENTOMOLOGICAL NEWS 8-10

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Variant Elytral Markings of Epilachna varivestis Muls. (Coleoptera: Coccinellidae).

By B. J. LANDIS and HORATIO C. MASON, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

Unlike the elytral spots in many species of predacious coccinellids, these spots in *Epilachna varivestis* Muls. are relatively constant in number and size. Each elytron normally has eight spots or dots of varying size arranged in three rows as follows: Three small sub-basal spots in a broken row, the median spot less basal than the other two; three in a transverse subparallel row just before the middle, usually larger than the sub-basal; and two near the apex (Chittenden, '20) (fig. A).

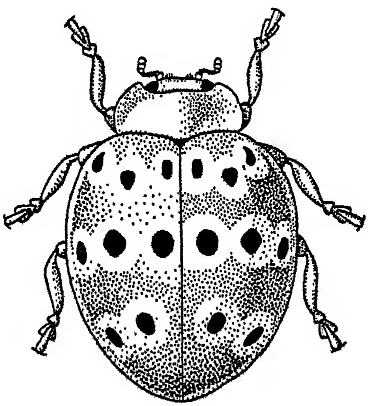


Figure A.—Adult of *Epilachna varivestis* Muls., showing normal number and size of spots.

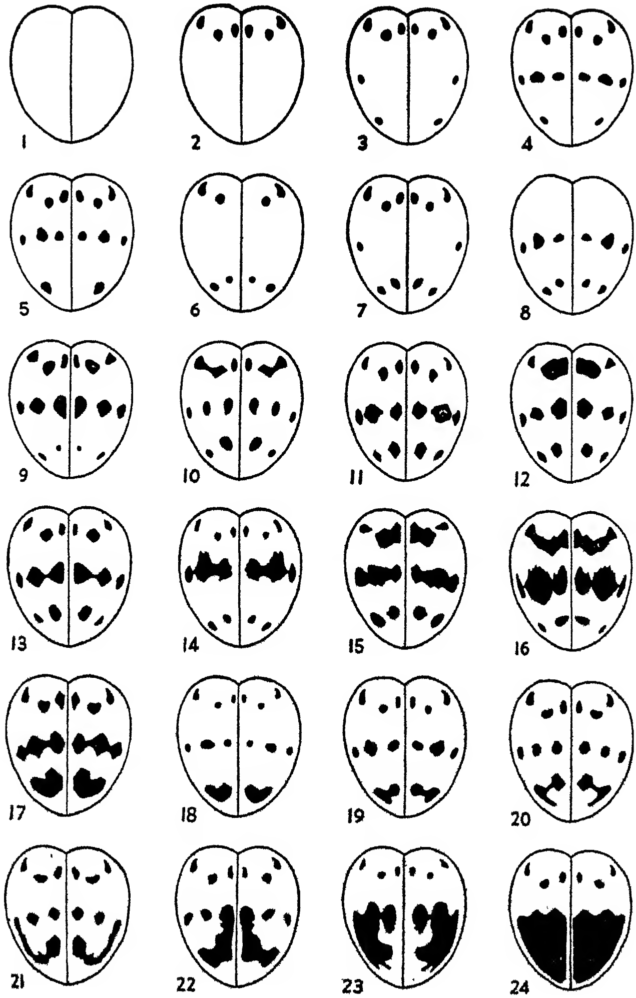
Among several thousands of beetles handled in hibernation and life-history studies in Ohio and the Federal District of Mexico, the authors occasionally found beetles with odd markings. Beetles having variant markings occurring on each

elytron were saved and the several types are here figured and discussed briefly. To clarify the discussion, each of the eight elytral spots has been given a number, beginning with the outside spot on the sub-basal row and proceeding to the elytral suture, and continuing in the same direction, from outside to inside, for the intermediate row and then the apical row of spots (Johnson, '10).

Certain differences were noted between the variant beetles from Mexico and Ohio. In the Mexican beetles there was a tendency for the normal spotting to be altered by the dropping of spots, whereas in Ohio beetles the abnormalities were caused entirely by the confluence of spots. One mature albino beetle (fig. 1) was found at Columbus, Ohio, in which the eyes, elytra, and other body parts were concolorous with the normal ground color.

In the beetles from Mexico spot 8 was lost most commonly (figs. 2 to 5), although the entire intermediate row also (spots 4, 5, and 6) was absent in two individuals (figs. 2 and 6). In one beetle spots 1, 2, and 3 (fig. 8), and in another spots 4, 5, 6, 7, and 8 (fig. 2), were lacking. The confluence of spots 7 and 8 was common (figs. 18 and 19), and in one individual spots 4, 5, 6, 7, and 8 were confluent (fig. 23). Two beetles with spotting identical with that shown in Figure 23 were found in a small field of beans near Mexico City on the same day. The confluence of spots 4, 5, and 6 (figs. 14 and 17) was not common.

In the beetles from Ohio spots 5 and 6 coalesced most commonly (fig. 13), and several individuals having this type of confluence occur in samples of 1,000 to 2,000 beetles. In one beetle spots 4, 5, and 6 coalesced (fig. 15), and this type of confluence was observed also in a beetle from Birmingham, Ala. In the Birmingham beetle spots 1, 2, and 3 also coalesced (fig. 16). Confluence of spots 2 and 3 is more common among Ohio beetles (figs. 12 and 15) than confluence of spots 1 and 2 (fig. 10). Fusion of spots 7 and 8 occurred in four beetles (figs. 20, 21, 22, and 24) but did not form an arcuate fascia as in Mexican beetles. Interesting types of confluence are illustrated



Figures 1 to 24, inclusive, showing deviation from the normal elytral spotting in adults of *Epilachna varivestis* Muls. Figures 2, 3, 4, 5, 6, 7, 8, 14, 17, 18, 19, and 23 represent beetles from the Federal District of Mexico; Figures 1, 9, 10, 11, 12, 13, 15, 20, 21, 22, and 24, from Columbus, Ohio, and Figure 16, from Birmingham, Alabama.

in Figure 21, where spots 4, 7, and 8 fuse, and in Figure 22, where spots 6, 7, and 8 coalesce. The greatest confluence of

spots was observed in three beetles found in a collection of approximately 5,000 beetles from Letart Falls, Ohio. In these beetles spots 4, 5, 6, 7, and 8 coalesced to form a large triangular fascia (fig. 24). An egg mass was obtained from one of these beetles, and of two individuals reaching the adult stage one had the same elytral spot confluence as the parent female.

LITERATURE CITED.

CHITTENDEN, F. H. 1920. The Bean Ladybird. U. S. Dept. Agr. Bull. 843, 24 p., illus.

JOHNSON, ROSWELL, H. 1910. Determinate evolution in the color-pattern of the Lady-Beetles. Pub. 122, Carnegie Inst. Wash., 104 pp., illus.

Corrections and Additions to a recent Catalog of the Tiphiidae, (Hymenoptera).[1]

By KARL V. KROMBEIN, 22 Meadow View Place, Buffalo, New York

Since the publication of Dalla Torre's Catalogus Hymenopterorum in the last decade of the nineteenth century a large number of new species and genera have been described particularly in the groups which are of importance in the biological control of noxious insects. Consequently the appearance of a new catalog of the Hymenoptera should be most welcome to workers in this order. Inasmuch as I have just recently compiled a card catalog of the family which comprises the first part of this new Catalogus I feel it necessary to call attention to certain omissions and corrections which may serve to make the catalog more useful to systematists.

OMISSIONS.

Unquestionably the most serious fault has been in not citing the species which were originally described as species of *Tiphia* and later transferred to other genera outside the family as understood by Hedicke. Such omissions, if continued in the other parts of this new catalog, will lead to the eventual creation of a number of homonyms since the dilettante systematist,

[1] Hedicke, H. Hymenopterorum Catalogus, Pars I, Tiphiidae, 32 pp. 1936. (publ. W. Junk).

interested only in seeing his own name after a species, will merely check over the names in the Catalogus to determine whether the name he wishes to propose has been used before rather than to dig through all the early literature to compile his own catalog. To obviate the cause of such confusion it is sincerely hoped that successive parts of the Catalogus will cite these transferred species as an appendix to each genus as I have done here in the Appendix to this critique.

The following species which belong in the Tiphiidae as comprehended by Hedicke have been omitted from his catalog:

TIPHIA BREVILINEATA Allen and Jaynes. Proc. U. S. N. M., LXXVI: 70, 1930. ♀

T. FORTISTRIOLATA Cameron. Invert. Pacif., I: 170, 1907. ♂.

PARATIPHIA CANALICULATA Cameron. Biol. Centr.-Amer., Hym., II: 237, no. 6, 1893. ♀ (*Epomidiopteron*).
Dalla Torre, Cat. Hym., VIII: 143, 1897. (*Epomidiopteron*)
Cameron, Invert. Pacif., I: 105, 1905. (*Paratiphia*)

EPOMIDIOPTERON HETEROSPILUM Cameron. Timehri, Journ. Roy. Agr. & Commerc. Soc. Brit. Guiana, (3) II: 417, 1912. ♀

CORRECTIONS.

Scoliphia Banks should be placed as a synonym of *Epomidiopteron* de Romand[2]. *S. spilota* Banks is doubtfully distinct from *Epomidopteron julii* de Romand.

TIPHIA CANALICULATA Cameron, 1902 has priority over *T. himalayensis* Cameron, 1904 and the species should appear under the former name rather than the latter.

T. UNICOLOR Lepeletier, 1845 has priority over *T. polita* Costa, 1858 and the species should appear under the former name rather than the latter.

Inasmuch as a varietal name has no status in nomenclature it is not necessary to use *Tiphia notopolita* var. *alleni* Roberts for *T. notopolita* var. *intermedia* Allen and Jaynes.

T. DENTICULA Cameron is mis-spelled and appears in the

[2] Bridwell (Proc. Hawaii. Ent. Soc., IV: 119, 1919) is the authority for this synonymy.

catalog as *T. denticulata.*

T. MINUTOPUNCTATA Allen and Jaynes should follow *T. minuta* van der Linden.

EPOMIDIOPTERON 12-MACULATA (Cameron) is placed under *Paratiphia* as *decemmaculatus* and should be transferred to *Epomidiopteron* with the original orthography.

Some papers issued as parts of a serial publication have been cited incorrectly. For example in the reference listed under *Tiphia inornata* Say, we find the following citation—"Bradley, List Ins. N. York p. 922, 1928." To facilitate reference to this work it should have been cited as follows: Bradley [in Leonard], List Ins. New York, Cornell Univ. Agr. Expt. Sta., Memoir 101, p. 922, 1928.

In my opinion *Tiphia reticulata* Malloch is the name which should be used for the species Hedicke lists as *T. intermedia* Roberts. *T. intermedia* was proposed by Malloch as a new variety of *punctata* Robertson (preoccupied by *T. punctata* Smith) preceding by two pages *T. reticulata* which was described as a new species. Inasmuch as a varietal name has no standing in nomenclature and although *intermedia* Mall. has page priority over *reticulata* Mall., the latter should be used. Roberts, recognizing that *punctata* Robertson was preoccupied, raised *intermedia* Mall. to specific rank and proposed the variety *exitalis* for the variety *intermedia.* Allen after studying Malloch's type material concluded that *intermedia exitalis* and *reticulata* were conspecific. As I understand it the synonymy is as follows:

TIPHIA RETICULATA Malloch. Ill. Nat. Hist. Surv. Bull., XIII: 23, 1918. ♀

Tiphia punctata Robertson. Trans. Amer. Ent. Soc., XXVII: 196, 1901. ♂ (*nec T. punctata* Smith, 1873).

Tiphia intermedia Roberts. Can. Ent., LXII: 189, 1930.

VAR. INTERMEDIA Malloch. Ill. Nat. Hist. Surv. Bull., XIII: 21, 1918. ♀

Tiphia intermedia var. *exitalis* Roberts. Can. Ent., LXII: 189, 1930.

Two homonyms have been overlooked by Hedicke so I here-

by propose the following new names:

Tiphia turneri[3], *nom. nov.*, for *Tiphia pedestris* Gerstaecker, 1857 (*nec Tiphia pedestris* Fabricius, 1775).

Tiphia palmi[4], *nom. nov.*, for *Tiphia rufipes* F. Smith, 1855 (*nec Tiphia rufipes* Latreille, 1797).

In conclusion I might add that I am not in agreement with Hedicke's limitation of the family Tiphiidae to the six genera which he has included. Nothing is to be gained by erecting a separate family for every few genera in the Scolioid Hymenoptera and the Myzininae certainly are very closely related to the Tiphiinae proper, as are also the Brachycistinae. However, this is a point which must be settled to his own satisfaction by each worker in the field.

Appendix.

The following species which were omitted by Hedicke were described originally as species of *Tiphia* and were relegated later to other genera.

Tiphia abdominalis Panzer. Fauna Ins. German., Heft 53: T. 5, 1798. To Sphecidae.

T. annulata Fabricius. Ent. Syst., p. 225, no. 7, 1793. To Scoliidae.

*T. bipunctata Perty. Delect. anim. artic. Brasil., p. 139, T. 27, f. 12, 1833. To Anthoboscidae (?).

T. brevicornis Panzer. Fauna Ins. German., Heft 53: T. 6, 1798. To Apoidea.

T. caroliniana Panzer. Krit. Revis., II: T. 1, f. a-c, 1806. To Myzininae in Tiphiidae.

T. cenoptera Panzer. Fauna Ins. German., Heft 81: T. 14, 1801. To Bethylidae.

T. ciliata Fabricius. Mant. Ins., p. 279, no. 7, 1787. To Scoliidae.

*T. cingulata Klug. *In* Weber & Mohr, Beitr. z. Naturk., II: 185, no. 3, 1810.

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[3] For Mr. Rowland E. Turner in recognition of his studies in the aculeate Hymenoptera.

[4] For Professor Chas. E. Palm of the Cornell University Department of Entomology.

* Original not seen.

T. COLLARIS Fabricius. Syst. Ent., p. 354, no. 7, 1775. To Scoliidae.

T. CRASSICORNIS Fabricius. Mant. Ins., p. 278, no. 2, 1787. To Sphecidae.

T. DORSATA Fabricius. Mant. Ins., p. 279, no. 11, 1787. To Scoliidae.

T. EPHIPPIUM Fabricius. Syst. Ent., p. 353, no. 4, 1775. To Myzininae in Tiphiidae.

T. FLAVIPES Fabricius. Ent. Syst., p. 224, no. 3, 1793. To Sphecidae.

T. GROSSA Fabricius. Syst. Piez., p. 232, no. 4, 1805. To Scoliidae.

T. HAEMORRHOIDALIS Fabricius. Syst. Ent., p. 353, no. 3, 1775. To Sphecidae.

T. HEMIPTERA Fabricius. Supplem. Ent. Syst., p. 254, no. 1-2, 1798. To Bethylidae.

T. HISTRIONICA Fabricius. Mant. Ins., p. 279, no. 4, 1787. ?

T. INTERRUPTA Say. Narr. Exped. St. Peter's Riv., p. 322, no. 2, 1824. To Myzininae in Tiphiidae.

T. MACULATA Fabricius. Ent. Syst., p. 224, no. 4, 1793. To Myzininae in Tiphiidae.

*T. MARGINATA Klug. *In* Weber & Mohr, Beitr. z. Naturk., II: 184, no. 2, 1810. ?

T. MIXTA Fabricius. Supplem. Ent. Syst., p. 254, no. 10-11, 1798. ?

T. NIGRA Fabricius. Ent. Syst., p. 225, no. 9, 1793. To Scoliidae.

T. OBSCURA Fabricius. Syst. Piez., p. 233, no. 8, 1805. To Myzininae in Tiphiidae.

T. QUINQUECINCTA Fabricius. Syst. Ent., p. 353, no. 2, 1775. To Myzininae in Tiphiidae.

T. RADULA Fabricius. Syst. Ent., p. 354, no. 5, 1775. To Scoliidae.

T. RUFICORNIS Fabricius. Mant. Ins., p. 279, no. 12, 1787. ?

T. RUFIVENTRIS Panzer. Fauna Ins. German., Heft 53; T. 4, 1798. To Sphecidae.

T. SERENA Fabricius. Ent. Syst., p. 224, no. 4, 1793. To

Myzininae in Tiphiidae.

T. THORACICA Fabricius. Supplem. Ent. Syst., p. 254, no. 15-16, 1798. To Scoliidae.

T. TRICINCTA Fabricius. Syst. Ent., p. 354, no. 6, 1775. To Scoliidae.

T. TRIFASCIATA Fabricius. Ent. Syst., p. 226, no. 14, 1793. To Scoliidae.

T. TRIPUNCTATA Rossi. Fauna Etrusca., II: 69, no. 831, T. 6. f. 10, 1790. To Myzininae in Tiphiidae.

T. VARIEGATA Fabricius. Mant. Ins., p. 179, no. 6, 1787. To Sphecidae.

New Species of Pacific Coast Coleoptera. (Cleridae, Pyrochroidae, Chrysomelidae).

By EDWIN C. VAN DYKE,
University of California, Berkeley, California.

FAMILY CLERIDAE.

Bostrichoclerus, new genus.

Large, elongate, very finely and sparsely pilose. Head large; eyes large, transverse, coarsely granular, feebly emarginate in front, and very prominent; antennae long, eleven segmented, scape robust, segments 2-5 about twice as long as broad, feebly clavate and quite glabrous, a few stiff hairs only being evident, segments 6-10 moderately serrate, eleventh fusiform, the free angles of 6-8 densley clothed with fine silky pile and the three following segments completely clothed; a prominent horn, laterally compressed and bifid at apex, arising from in front of each eye and just within the insertion of the antennae giving the latter the appearance of arising from their bases; mandibles robust; maxillary palpi four segmented, labial palpi three segmented, the terminal segments of both sets securiform, that of the labial palpi the larger, and almost an equilateral triangle. Prothorax robust, somewhat longer than broad, broadly constricted at sides in front of middle and narrowed posteriorly, basal margin a complete and well defined bead; coxal cavities rounded and narrowly opened behind. Elytra almost three times as long as prothorax, two and a half times as long as broad, rather finely, densely and irregularly punctured and without striae except for fine sutural striae close to the suture and extending from about the middle almost to the apex. Anterior

coxae conical, very narrowly separated, trochantine not visible; middle coxae feebly conical, well separated and with evident trochantine; hind coxae transverse. Abdomen with five free ventral segments. Legs long and moderately slender; tibiae with short terminal spurs; tarsal segments all well developed, flattened dorsally, 1-4 broad yet longer than broad, with the usual membranous appendages and densely papillose beneath, the fifth with sides somewhat papillose; claws simple.

Genotype: *Bostrichoclerus bicornus*, new species.

This rather remarkable genus belongs in the tribe Tillini and because of its coarsely granular eyes, somewhere near *Cymatodera*. It, however, does not look at all like any species of the latter genus but at first sight rather like a large species of the genus *Polycaon* of the family Bostrichidae, also because of its size and general appearance somewhat suggests *Natalis* which is structurally quite removed. Its distinctive peculiarities are the prominent frontal horns, the type of antennae and the elytra without discal striae.

Bostrichoclerus bicornus, new species.

Rather large, dark brown and somewhat shining. Head flattened in front, rather densely punctured above, smooth and sparsely punctured anteriorly, with a faint medial, longitudinal impression on front and sparsely pilose. Prothorax about a sixth longer than broad, base lobed at middle and sinuate each side, apex broadly arcuate and overhanging, disk irregularly punctured, more closely and deeply so in front and with short, reclinate hair arising from the punctures and a few, long erect hairs widely scattered about, and broadly and feebly impressed at middle. Scutellum semicircular, densely punctured, rugose and concave. Elytra moderately convex, with pronounced though well rounded humeri, sides almost parallel and disk somewhat dull as the result of the dense punctuation and fine rugoseness. Beneath somewhat shining, rather closely punctured anteriorly and sparsely behind. Legs with apices of tibiae beneath and undersurfaces of the tarsal segments from 1-4 densely clothed with short, silky, orange pile. Length 20 mm (with head flexed), breadth 6.5 mm.

Holotype (No. 4682 Mus. C. A. S. Ent.), a unique from Palm Cañon, Angel de la Guardia Is., Gulf of California, collected May 3, 1921, by J. C. Chamberlin, from beneath bark.

This insect is one of our largest clerids and like nothing else

in our fauna.

Enoclerus inyoensis, new species.

Small, black, with fulvous tibiae, antennae in great part and palpi rufous, and the elytra varicolored, the color pattern being as follows: the anterior half a reddish orange except for an hour-glass-shaped, sutural, black marking, broadest in front about the scutellum and a blackish line along the lateral margin in front of the median gray bar; the posterior portion densely clothed with gray pile upon a light background except for a broad, black transverse bar at the posterior third which bisects the gray patch, which may or may not be broken at the suture, and which has the pile covering it short, closely appressed and unicolorous with it. Head with front rather finely, closely punctured at sides, with a smooth, blunt ridge at center, and covered with long gray pile. Prothorax cuneate, narrowed behind, with a narrow transverse impression near base and a shallow, broader impression somewhat back of the apex, the surface finely, rather closely punctured and with gray pile at base, sides and to a slight degree in the center, elsewhere with long, black hair which extends somewhat onto the head. Elytra rather finely, closely punctured, finely rugose, and provided with scattered, erect, black setae in addition to the pubescence mentioned before. Beneath rather shining, sparsely, finely punctured and with short, scattered gray pile. Length 5-6 mm., breadth 1.75-2.25 mm.

Holotype (No. 4683 Mus. C. A. S. Ent.) and three *paratypes* from the Panamint Mts., Inyo Co., CALIFORNIA, collected as follows: three including type, May 29, 1937, the fourth June 18, 1937, and two by D. Little, and one each by J. W. Johnson and myself. All were beaten from pinyon pine, *Pinus monophylla* Voss.

This attractive little clerid is of about the same size as *lecontei* (*nigriventris*) (Lec.) and *humeralis* Schf., and resembles them also in having the elytra marked with a median transverse gray band and gray apex. It is less narrow and elongate than either, has a large reddish orange humeral patch, lacking in *lecontei* and much more extensive than in *humeralis*, has the gray, median bar broad and evenly arcuate, whereas it is narrow and zig-zag in *lecontei* and much vaguer in *humeralis*, and the black bar sharply defined with even margins while

it has irregular boundaries in *lecontei* and is but poorly defined in *humeralis*. In addition the tibiae are fulvous or rufus in *inyoensis* and black in the other species.

FAMILY PYROCHROIDAE.

Ischalia (Eupleurida) californica, new species.

Orange yellow except for the antennal segments 3-9 which are black and a large black, median elytral vitta which extends from near the base to near the apex, being about one half the width of the disk in the basal two thirds and expanded apically in the form of a transverse bar clear to the lateral margins. Head flattened in front with a small tubercle between the anterior margins of the eyes. Prothorax about one fourth broader than long, sides carinate and feebly arcuate posteriorly, more evidently rounded and convergent in front, hind angles slightly projecting posteriorly; disk bigibbous in front, with a pronounced median carina behind which extends posteriorly beyond basal border, with large transverse impressions on either side of carina and a finely pubescent surface. Scutellum tubercular. Elytra over twice as long as broad, with the sutural and lateral margins carinate as in *costata* and *vancouverensis* but with the lateral discal carinae broadly expanded throughout their course, the disk between finely, densley punctured inwardly towards suture and more coarsely and distantly punctured outwardly towards lateral carinae. Beneath unicolored orange and finely punctured and pubescent as in the other American species. Length 5-6.5 mm., breadth 2-2.5 mm.

Holotype (No. 4684 Mus. C. A. S. Ent.) and numerous designated *paratypes* from a large series of specimens collected near Weott, Humboldt Co., CALIFORNIA, July 13, 1929. I have also collected it near Arcata, Humboldt, Co., Calif.

This species I have been considering for some time as but a subspecies of *vancouverensis* but a more careful study has shown me that it is quite distinct. It differs from *vancouverensis* in the color pattern, in having the posterior prothoracic angles not divergent as they are in the latter, in the type of punctuation of the disk of the elytra and in the uniformly broad lateral carinae of the elytra. It has the antennal segments 3-9 a sooty black whereas they are merely fuscous or piceous in *vancouverenis;* the discal black markings of the elytra not expanded until the posterior third, then reaching

fully to the lateral margins whereas in the other the expansion is from the middle to near the apex and only reaches the lateral carinae at the sides; and the abdomen is orange in *californica* while black in *vancouverensis*. In the latter the discal elytral punctuation between the lateral carinae is uniformly coarse and somewhat reticulate while quite fine and dense towards the suture and coarser near the lateral carinae in *californica*. The lateral carinae in *californica* are uniformly wide until near their apices, in *vancouverensis* and also in *costata* they are considerably narrower as well as more depressed from about the middle.

In a recent paper Dr. Blair[1] has resurrected *Euplerida* Le Conte, for the American species chiefly on account of their being wingless and lacking a small supplementary humeral carina which is evident in all known Old World species. I prefer, however, to consider *Eupleurida* as but a subgenus of *Ischalia*, not deeming the divergent characters of sufficient importance, especially when one considers the very numerous points of resemblance, also the fact that one oriental species, the Japanese, *I. patagiata* Lewis, has the wings incompletely developed. I have always found our two Pacific Coast species about fungous growth on old decaying logs. At one time I split open a small hollow log of tanbark oak, *Lithocarpus densiflora* (H. and A.), and found the entire cavity lined with white mycelium upon which numerous larvae and adults of *californica* were feeding.

Key for the separation of the American species of Ischalia

1. Head black, elytra black except for median portion of lateral carinae, middle part of side margin and apices which are yellow; lateral carinae gradually narrowed from base to apex;
   Alleghany Mts. .... *costa*
   Head orange 2
2. Abdomen black and elytra with broad black median vitta extending from base of elytra to middle where suddenly dilated to lateral carinae; lateral carinae of elytra narrowed from about the middle to apex; West Br.

[1] Notes on the Colepoterous Genus *Ischalia* Pascoe, ect., by K. G. Blair, Ent. Mo. Mag., 3d Ser., Vol. VI (1920), pp. 133-135.

Col., West Wash. .... *vancouverensis*

Abdomen orange, the broad black elytral vitta extending from base to posterior third where suddenly dilated to lateral margins; lateral carinae of equal breadth from base to posterior third, then narrower; Humbolt Co., Calif. .... *californica*

FAMILY CHRYSOMELIDAE.

GLYPTOSCELIS ILLUSTRIS **aridis** new subspecies.

Somewhat similar to the typical *illustris* but differing by being proportionally shorter and broader and much more densley pilose, hence less brilliant. In typical *illustris* the proportions are: for the prothorax, length .3 to breadth .35; and for the elytra, length .75 to breadth .45; while in *aridis*, the proportions are: for the prothorax, length .27 to breadth .37; and for the elytra, length .7 to breadth .5. The anterior margin of *illustris* as seen from the side is much more oblique than in *aridis;* the white pile in *illustris* is condensed along sides of both prothorax and elytra and along elytral suture and in more or less vague, interrupted vittae on elytral disk with a larger patch at sides near the middle, while in *aridis* it is denser and more uniformly disposed; and the sparse golden brown hairs of *illustris* are scattered over the more or less denuded coppery surface of both pronotum and elytra while the light brown pile of *aridis* is most evident near the apex of the pronotum and about the humeri and posteriorly at the sides of the elytra. The impression about the scutellum also appears to be deeper in *illustris* than in *aridis.*

Holotype male, *allotype* female (Nos. 4685-4686, Mus. C.A.S. and five paratypes, the holotype, allotype and one paratype collected June 15, 1937, on the Westgard Pass Plateau, Inyo Mts., Inyo Co., CALIFORNIA, the first two by myself, the third which is now in the collection of B. E. White by one of my students; two other specimens collected May 27, 1937, by myself and June 7, 1937, by L. D. Phillips from the same locality and the remaining two specimens collected by Albert Koebele, in May 1891, in the Argus Mts. of Inyo Co., Calif. There are no doubt several other Argus Mt. specimens collected by Albert Koebele in the U. S. National Museum Collection. All the Inyo Mt. specimens and presumably also the Argus Mt. specimens were beaten from pinyon pine, *Pinus monophylla* Voss.

The typical *illustrus* of the Sierra Nevada Mts. is generally to be found on the ponderosa pine, *Pinus ponderosa* Lawson.

This interesting subspecies of the desert ranges of southeastern California when placed near typical specimens of *illustris* stands out very distinctly because of its greater piloseness, in fact looks very much like some of the other and more uniformly pilose species. Other species of the genus *Glyptoscelis* which, by the way, has been recently reviewed[2], that are to be found in its territory are *sequoiae* Blasid. on juniper and in Owens Valley, *alternata* Cr. on a species of wild vetch, *Glycyrrhiza lepidota* (Nutt.) and on other annuals.

An Improved Method of Bleaching Insect Specimens

By BRYANT E. REES, Stanford University, California.

Various methods of bleaching melanic insect specimens for morphological study have been suggested, but all of them have the defect of requiring an excessive lapse of time between the beginning and end of the process. Soaking in Eau de Labarraque (hypochlorite of soda) or in Eau de Javelle (hypochlorite of potash), or boiling in hydrogen peroxide are some of the methods that have been advocated. An improved method is described by Blackwelder in his paper on the Morphology of the Coleopterous Family Staphylinidae (Smithsonian Miscellaneous Collections, Vol. 94, No. 13, 1936.) He employed the procedure of boiling the insects for a few minutes in KOH and then placing them in a 3% solution of hydrogen peroxide to which has been added a small amount of ammonia (about one drop per cc. of peroxide). By this method two to six hours are required to bleach dark sclerites and the treatment has the great advantage of leaving the edges and the sutures darker than the rest.

This method as described by Blackwelder gives excellent results, but the time involved is still excessive; and so, beginning

[2] A study of the Genus *Glyptoscelis* Le Conte in America North of Mexico, by N. L. H. Krauss, Univ. Calif. Publ. in Entom., Vol. 7, No. 2, pp. 21-39, 9 fig. (1937).

with this method, the present author has attempted to shorten the time required for its application. The method was varied in several ways and controls were obtained for the various types of specimens or parts of specimens. A beetle of the genus *Harpalus* was used as a test standard. Stronger hydrogen peroxide was employed, the 20% solution which is obtainable at drugstores being used.

Specimens or parts of specimens of light pigmentation, but yet dark enough to justify some bleaching, are boiled for 4 or 5 minutes in 10% KOH or less time if necessary to avoid the breaking down of tissues. These are then transferred directly to a vial containing about 5 cc. of 20% hydrogen peroxide to which has been added 13 to 16 drops of ammonia and allowed to stand with frequent shakings. (Do not stopper vial.) Fifteen to thirty minutes are required for bleaching. If more time is desired for less pigmented parts or for slower and better control, smaller amounts of ammonia should be used. Three to five drops of ammonia to 5 cc. of peroxide result in a slower bleaching time of one to one-and-a-half hours. The ratio of 13 to 16 drops of ammonia to 5 cc. of hydrogen peroxide is found most satisfactory and is used throughout the whole method unless otherwise specified. Also the small amount of KOH carried over with the parts of the specimens seems to better insure the bleaching.

For a more rapid bleaching of any part or for more heavily pigmented parts the method may be hastened by boiling the pieces for 5 minutes in 10% KOH, transferring the parts directly to the peroxide and ammonia solution for about one minute, and then transferring them back to *boiling* KOH. Rapid bleaching occurs in the KOH and should be closely watched. The parts or specimens are again placed in the peroxide and left from one to three minutes or until the desired degree of discoloration is reached. If necessary this may be repeated. The reaction is stopped by washing the parts in alcohol. The procedure may be completed in 10 to 15 minutes.

Even more rapid bleaching or the bleaching of very heavily

pigmented parts or specimens as *Harpalus* or *Eleodes* may be obtained by boiling them in KOH for 5 minutes and then transferring them to a casserole containing approximately 15 to 20 cc. of *clear, boiling* KOH. (Used KOH may be poured off and new added to the casserole containing the specimen and heated to boiling.) To this is added about 3 cc. of 20% hydrogen peroxide and approximately 8 drops of ammonia. This is allowed to boil. It should be closely watched as the time required is shortened to from 30 seconds to a few minutes depending on the specimens or parts of specimens. When the desired stage of bleaching is reached the reaction can be stopped by transferring to alcohol. This procedure gives very satisfactory results with whole specimens, and the speed may be controlled by the amount of peroxide added to the boiling KOH. If punctures are made in the membranes of all insects the bleaching is more uniform for specimens still containing muscles. By this procedure *Eleodes,* one of the most refractory insects that can be suggested because of the thickness of its derm and heavy pigmentation, was easily bleached to a workable condition in 15 minutes.

Vernon Lyman Kellogg

A resolution adopted by the Division of Biology and Agriculture of the National Research Council, published in *Science* for June 3, 1938, contains the following: Vernon Lyman Kellogg was born in Emporia, Kansas, December 1, 1867. After a long and distressing illness he finally put aside the heavy burden at Hartford, Connecticut, August 8, 1937. He attended the University of Kansas where he graduated in 1889. Here he became assistant professor of entomology in 1890; he was called to Leland Stanford University in 1894 as assistant professor. He became active in the formation and administration of the National Research Council, in which he was chairman of the Division of Biology and Agriculture. Later he became secretary of the Council until ill health forced him to retire in 1932. The Division here records its heartfelt appreciation of his services in the Division and in the wider circle of the Council as a whole.

Notes on some Dragonflies (Odonata) from Admiralty Island, Alaska.

By Leonora K. Gloyd,

Among the recent additions to the Williamson Collection of Odonata in the Museum of Zoology of the University of Michigan, are some dragonflies from Admiralty Island, Alaska, collected by R. R. Sheppard during the summer of 1933. They are of interest largely because no specimens from this island are recorded in the literature and because three of the species, *Sympetrum danae* (Sulzer), *Somatochlora semicircularis* (Selys) and *Aeshna interrupta interrupta* Walker, have not been previously reported from Alaska.

Admiralty Island (57° to 58° 30′ latitude and 133° 50′ to 135° longitude) is about 110 miles long and 30 miles wide, and lies a little south of Juneau between the mainland and a group of seaward islands. The topography is rough with mountains rising rather abruptly from the coast to elevations of 2,000 to 4,000 feet.* According to Mr. Sheppard practically the whole island is heavily timbered, chiefly with spruce and hemlock but with some yellow cedar. It has numerous lakes two to four miles in length, many streams and beautiful meadows near the coast and in the mountain basins.

Mr. Sheppard collected insects from June 22 to August 29, but no dragonflies were taken until July 15. His field records, from which the following habitat notes are taken, show that representatives of this group were obtained from four general locations in the vicinity of Mole Harbor and Mole River:

(1) A meadow near the mouth of Mole River. "The meadows are densely green with various grasses, cinquefoil and a smaller element of skunk cabbage, deer cabbage, daisies, and many shorter plants. In some places the grass is very high, five feet or more, in other places where the cinquefoil is dominant, the herbage is six inches or less high." July 26, weather clear with hot sunshine, temperature 62°F. at 9:00 A. M.,

*A detailed account is given by Charles W. Wright in "A reconnaissance of Admiralty Island," 1906, U. S. Geol. Surv. Bull. 287, pp. 138-161, map.

66° at 3:00 P. M. August 16, rain. August 19 (on flats near shore), rain most of day except from 11-11:30 A. M. August 21, rain in morning, cloudy in afternoon.

(2) Alexander, Beaver and Hasselberg lakes. These are "wooded lakes bordered with alders, blueberries, ferns, devil's club, sphagnum, grasses, herbs, and other vegetation." Lake Alexander was visited on June 26 but no dragonflies were collected. On July 15, a clear day with bright sunshine, all three lakes were visited and the only species taken was *Enallagma cyathigerum* (Charp.). The temperature at 8:00 A. M. was 62°F.

(3) Swamps and meadows on the trail from Mole Harbor to a mountain basin south of the harbor, elevation about 1500 feet. August 25, weather clear and warm after slight fog in morning.

(4) A mountain basin with ponds of melted snow, elevation about 3000 feet. The meadows were "covered with heather, deer cabbage, grasses, sedges, lupine, asters, and other plants." August 26, weather clear and warm.

List of Species.

Leucorrhinia hudsonica (Selys). August 25, 2 ♂; August 26, 2 ♂ 1 ♀.

Sympetrum danae (Sulzer). August 21, 1 ♂.

Somatochlora albicincta (Burmeister). August 25, 1 ♂; August 26, 1 ♂.

Somatochlora semicircularis (Selys). August 25, 1 ♂.

Aeshna eremita Scudder. August 19, 1 ♀.

Aeshna interrupta interrupta Walker. August 19, 1 ♂.

Aeshna juncea (Linné). August 21, 2 ♀; August 25, 1 ♂.

Aeshna palmata Hagen. July 26, 1 ♂; August 16, 7 ♂; August 19, 1 ♀; August 21, 5 ♂.

Enallagma boreale Selys. July 26, 1 ♂; August 16, 1 ♂ 1 ♀; August 19, 1 ♂; August 25, 1 ♂. The black areas of the thorax and abdomen show a tendency to be broader and more extensive than those of specimens from more southern localities.

ENALLAGMA CYATHIGERUM (Charpentier). July 15, 8 ♂. In this series the dark areas are more extensive than usual for this species. On the thorax the mid-dorsal black stripe covers half of the mesepisternum, the humeral is almost as wide as the pale antehumeral, a black line is present on the second lateral suture, and the metinfraepisternum is outlined in black. On the abdomen the dorsal black areas are slightly enlarged on segments 1 and 2 and conspicuously increased on 3 to 7 covering approximately the apical 1/3 of segment 3, ½ of 4, 2/3 of 5, 4/5 of 6, and all of 7 except for a narrow basal ring. In addition to the more extensive color pattern, segment 1 has a lateral oblique black stripe extending across the basal angle and slightly longer than half the segment; segment 2 has a sublateral black or dark brown bar of varying extent which does not touch either the base or apex of the segment but in some specimens is narrowly joined to the apical black area; and segments 8 and 9 which are usually entirely blue have large irregular dorso-lateral patches of black. The basal area of all three pairs of coxae is also black.

LESTES DISJUNCTUS Selys. August 16, 1 ♂ 1 ♀; August 25, 1 ♂; August 26, 3 ♂ 1 ♀. These specimens are small and very dark with a noticeable metallic green lustre, quite different in appearance from the larger and paler brown and yellow *disjunctus* from the southern part of the United States.

A preliminary study of the *disjunctus* material in the Williamson Collection indicates that a gradual but definite increase in size, and decrease in the extent and intensity of coloration, takes place from north to south and from high to low altitudes. The genital characters, however, remain constant throughout the entire population. In view of this color variation and the marked similarity in abdominal appendages and genitalia between this species and the bright metallic green *Lestes sponsa* Hansem of Europe, the metallic lustre of the dark northern specimens of *disjunctus* is especially interesting. A more thorough investigation is necessary to determine the exact nature of this relationship.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or last year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL. — **Anon.** — Association between nematodes and insects. [Nature] 141: 755. **Anon.**—Insecten in Sawarienoten. [58] 10, No. 219: 12-14. (S). **Barton, C.**—How it feels to be bitten by a black widow [spider]. [Nat. Hist., N. Y.] 48: 43-44. **Burks, Ross & Frison.**—An economical, portable light for collecting nocturnal insects. [12] 31: 316-318, ill. **Burr, M.**—The notorious case of Lady Glanville. [21] 50: 41-42. **Carpenter, Roman & Collin.**—Notes on insects collected in W. Greenland by the Oxford Univ. Greenland Expedition, 1936. [75] 1: 529-553, (*). **Cockerell, T. D. A.**—San Miguel Island, California. [Scient. Month.] 46: 180-187, ill. **Cooke, B. H.**—Nomenclature: a plea for common sense. [21] 50, Suppl.: (16). **Ewing, H. E.** The speed of insects in flight. [68] 87: 414-415. **García-Díaz, J.** — An ecological study of the fresh water insects of Puerto Rico. [J. of Agr. Univ. Puerto Rico] 22: 43-97, ill. **Marcovitch, S.**—The entomologist and human health. [Sci. Month.] 1938, June: 526-528. **Martini, E.** — Zur Frage der biologischen Arten. [110] 5: 33-43. **Martynov, A. V.**—Obituary by F. M. Carpenter. [5] 45: 80-83, ill. Obituary by T. D. A. Cockerell [68] 87: 292. **Meyrick, E.**—Obituary by T. B. Fletcher. [21] 50: 49-51, ill. **Nuttall, George H. F.**—Obituary by R. Matheson. [Journ. Parasit.] 24: 180-183, ill. Obituary by H. B. Ward. [68] 87: 337. **Urquhart, F. A.**—The insect collection of the Royal Ontario Museum of

Zoology. [4] 70: 67-70. **Wightman, A. J.**—The International Code of Zoological Nomenclature. [21] 50, Suppl.: (15)-(16). **Williams, H. B.**—Generic nomenclature. [21] 50, Suppl.: (13)-(15).

ANATOMY, PHYSIOLOGY, ETC.—Arndt & Viets.—Die biologischen (parasitologischen) beziehungen zwischen Arachnoideen und Spongien. [Zeit. f. Parasitenkunde] 10: 67-93. **Aubertot, M.** — Sur les membranes peritrophiques des insectes. [Arch. Zool. Exp. Gen.] 79, N. & Rev.: 49-57, ill. **Baerg, W. J.** — The poisons of scorpions and spiders, their effect and treatment. [Nat. Hist. N. Y.] 1938: 42-51, ill. **Bodenstein, D.**—Untersuchungen zum Metamorphoseproblem 1. — Kombinierte schnurings-und Transplantation- experimente an Drosophila. [87] 137: 474-505, ill. **Breakey & Olcott.**—The non-toxicity of gossypol to certain insects. [68] 87: 87. **Burns, R. K.**—Hormonal control of sex differentiation. [90] 72: 207-227, ill. **Cartwright, K. St. G.**—see under Hymenoptera. **Cochrane, F.**—An histological analysis of eye pigment development in Drosphila pseudo-obscura [Pro. R. S. Edinburgh] 57: 385-399, ill. **Corey, H. I.** — Heteropycnotic elements of Orthopterous chromosomes. [Arch. Biol. Paris] 49: 159-174, ill. **Dumitresco, M.**—Les glandes sericigenes tubulaires de Theridium tepidaraorum. [Arch. Zool. Exp. Gen.] 79, N. & Rev.: 58-68, ill. **Emerson, A. E.**—Termite nests—a study of the phylogeny of behavior. [Ecol. Monogr.] 8: 247-284, ill. **Fraenkel & Pringle.**—Halteres of flies as gyroscopic organs of equilibrium. [31] 141: 919-920, ill. **Geitler, L.** — Über den Bau des Huhekerns mit besonderer Beruchsichtigung der Heteropteren und Dipteren. [97] 58: 152-179, ill. **Goldschmidt, R.**—Intersexuality and development [90] 72: 228-242. **Gough, H. C.**—Toxicity of mercury vapour to insects. [31] 141: 922-923. **Hase, A.**—Zur hygienischen bedeutung der parasitären haus-und vogelwanzen sowie über wanzenpopulationen und wanzenkreuzugen. [Zeit. f. Parasitenkunde] 10: 1-30. **Heidermanns, H.** — Der Exkretstoffwechsel der wirbellosen Tiere. [88] 17: 263-267. **Helwig, E. R.**—The frequency of reciprocal translocations in irrediated germ cells of Circotettix verruculatus (Orth.). [Arch. Biol. Paris] 49: 143-158, ill. **Hopf, H. S.**—Investigations in the nutrition of the Ash-bark beetle, Hylesinus fraxini. [35] 25: 390-405. **Janisch, E.** — Eine neue Pilzkrankheit bei Nonnenraupen. [110] 5: 1-20, ill. **Kalo, M.**—

The diurnal activity of the strawberry weevil, Anthonomus bisignifer, with a note on the ecological meaning of the solar radiant energy. [Sci. Rep. Tohoku Imp. Univ. Japan] (4), 12: 511-530, ill. **Kettisch, J.**—Zur Kenntnis der Morphologie und Okologie der Larve von Cricotopus trifasciatus (Dipt.: Chironom.). [56] 16: 193-204, ill. **Korschelt, E.**—Cuticularsehne und Bindegewebssehne. [94] 150: 494-526, ill. (insects p. 498-503). **Krause, G.**—Einzelbeobachtungen und typische gesamtbilder der Entwicklung von Blastoderm und Keimanlage im ei der Gewachtshausschreche Tachycines asynamorus. [46] 34: 1-78, ill. **Kuhn & Piepho.**—Die Reaktionen der Hypodermis und der Versonschen Drusen auf das Verpuppenshormon bei Ephestia kühniella. [97] 58: 12-51, ill. **Larsen, O.**—Untersuchungen uber den geschlechtsapparat der Aquatilen wanzen. [Opuscula Ent.] 1, (Suppl.): 388 pp., ill. **Leach & Granovsky.**—Nitrogen in the nutrition of termites. [68] 87: 66-67. **Mast, S. O.**—Factors involved in the process of orientation in lower organisms in light. [Biol. Rev. Camb. Philosop. Soc.] 13: 186-224. (Insects p. 209-217, ill.) **Menner, E.**—Studien uber die Bewegung von Artemia salina und Branchipus stagnalis. [34] 122: 4-65, ill. **Patterson, J. T.**—Aberrant forms in Dropsophila and sex differentiation. [90] 72: 193-206, ill. **Pflugfelder, O.**—Untersuchungen über die histologischen Veränderungen und das Kernwachstum der Corpora allata von Termiten. [94] 150: 451-467, ill. **Plagge, E.**—Weitere Untersuchungen uber das Verpuppungshormon bei Schmetterlingen. [97] 58: 1-12, ill. **Pu, Chih-Lung.**—A comparative study of musculature of male genitalia in several species of Orthoptera. [Lingnan Sci. J.] 17: 21-31, ill. **Querci, O.**—Influence of reflected radiations on insects. [21] 50: 42-43. **Ribbans, C. R.**—Cytology of metamorphosis in the Culicinae. [31] 141: 920. **Schlottke, E.**—Die Hautung der Spinnenlungen und die dabei zu Beobachtende Grossenanderung der Zellkerne. [46] 34: 207-220, ill. **Schrader, K.**—Untersuchungen uber die Normal Entwicklung des Gehirns und Gehirntransplantionen bei der Mehlmotte Ephestia kuhniella nebst einigen Bemerkungen uber das Corpora allatum. [97] 58: 52-90, ill. **Slifer, E. H.**—The formation and structure of a special water-absorbing area in the membranes covering the grasshopper egg. [53] 80: 437-457, ill. **Stossberg, M.**—Die Zellorgange bei Entwicklung der Flugellschuppen von Ephestia kuhniella. [46]

34: 173-206, ill. **Watson, G. I.**—The jump of fleas. [31] 141: 923. **Woodhill, A. R.** — Salinity tolerance and pH. range of Culex fatigans. [31] 141: 920. **Yonge, C. M.**—Recent work on the digestion of cellulose and chitin by invertebrates. [Sci. Progress] 32: 638-647. **Zirngiebl, L.**—Uber weitere Missbildungen bei Blattwespen. [56] 16: 220-223, ill.

ARACHNIDA AND MYRIOPODA.—Arndt & Viets.—Die biologischen (parasitologischen) Beziehungen zwichen Arachnoideen und Spongien. [Zeitschr. Parasitenk.] 10: 67-93, ill. **Baerg, W. J.**—see under Anatomy. **Fox, I.** — Notes on North American spiders of the families Gnaphosidae, Anyphaenidae, and Clubionidae. [Iowa State Coll. J .Sci.] 12: 227-243, ill. (*). **Jacot, A. P.**—New moss-mites, chiefly mid-western, Ill. [Amer. Midland Nat.] 19: 647-657, ill. **Jenks, G. E.**—The birth of a baby black widow and its enemy, a small parasitic fly. [Nat. Hist. N. Y.] 1938: 52-57, ill. **Kaston, B. J.** — Family names in the order Araneae. [Amer. Midland Nat.] 19: 638-646. **Verhoeff, K. W.** — Uber Diplopoden des Zoologische Museums in Munchen. [89] Abt. Syst., 71: 1-54, ill. (k*). **Wells, F. L.** — "Shuttling" in Argiope aurantia. [5] 45: 62-71, ill.

THE SMALLER ORDERS OF INSECTS.—Banks, N. —New native Neuropteroid insects. [5] 45: 72-79, ill., (k). **Calvert, P. P.**—The larval development of dragonflies of the genus Aeshna. [68] 87: 393-394. **Crawfurd-Benson, H. J.**—Bionomics of a cattle louse. [31] 141: 921. **Keler, S.**—Zur Geschichte der Mallophagenforschung. [Zeitschr. Parasitenk.] 10: 31-66, ill. **Maslers & Moorefield.**—Dragonflies. [Bull. N. H. Soc. Maryland] 8: 24-27, ill. **Mathews, G. B.**—Tardigrada from North America. [Amer. Midland Nat.] 19: 619-627, ill. **Robertson, I. C.**—Cities that grow in the dark. Museum shows termite colonies. [Hobbies, Buffalo Mus. Sci.] 18: 102-105, ill. **Ross, H. H.**—Descriptions of nearctic caddis flies. [Bull. State Nat. Hist. Surv.] 21: 101-183, ill. (*). Lectotypes of North American Caddis Flies in the Museum of Comparative Zoology. [5] 45: 1-61, ill., (*). **Spieth, H. T.**—Two interesting mayfly nymphs with a description of a n. sp. [40] no. 970, 7 pp., ill. **Traver, J. R.**—Mayflies of Puerto Rico. [J. of Agric. Univ. Puerto Rico] 22: 5-42, ill. **Wagner, J.** — Aphanipterologische Notizen. [56] 16: 252-257, ill. Eine neue art "Helmtra-

gender" Flohe aus Bolivien. [Zeitschr. Parasitenk.] 10: 132-137, ill. **Wright, M.** — Notes on the dragonflies of Reelfoot Lake, Tennessee. [J. Tenn. Acad. Sci.] 13: 104-108.

ORTHOPTERA.—Ander, K.—Ein abdominales Stridulationsorgan bei Cyphoderris (Prophalangopsidae) und uber die systematische Einteilung der Ensiferen (Saltatoria). [Opus. Ent., Lund] 3: 32-38, ill. Diagnosen neuer Laubheuschrecken. [Opus. Ent., Lund] 3: 50-56, (S). **Hebard, M.**—The songs of grasshoppers. [Frontiers] 2: 164-165, ill. **Isely, F. B.**—Experimental study of the survival value of Acridian protective coloration. [68] 87: 40-41.

HEMIPTERA. — Ferris, G. F. — Contributions to the knowledge of the Coccoidea (Hom.) VII. [Microent.] 3: 37-56, ill. **Knowlton & Allen.**—Macrosiphum Aphids infesting Artemisia. [4] 70: 73-83, ill. (k*). **Larsen, O.**—See under Anatomy. **Miller, F. W.** — Generic check list of aphids and phylloxera. [Amer. Midland Nat.] 19: 658-672. **Ossiannilssohn, F.**—Uber Zetterstedts Cicada lividella und verwandte arten der gattung Deltocephalus (Cicadina) mit beschreibungen von zwei neuen arten. [Opuscula Ent.] 3: 1-6, ill. **Spooner, C. S.**—The phylogeny of the Hemiptera based on a study of the head capsule. [Univ. Ill. Bull.] 35, No. 70: 102 pp., ill. **Stofberg, F. J.** — The citrus red scale (Aonidiella aurantii). [U. S. Afr. Dept. Agric. & For.] Sci. Bull. 167: 1-23, ill.

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nuevas esp. Neotropicales. (Staph.). Descripcion de cuatro generos nuevos de Staphylinidae antillanos y sus genotypos. [115] 12: 119-138; 139-147, ill. **Cazier, M. A.**—New Acmaeodera & Chrysobothris from the southwest (Buprest.). [38] 37: 12-17. **Darlington, P. J.**—Dytiscus habilis in Texas. Loxandrus infimus in Texas. [5] 45: 84. **Jeannel, R.**—Les Migadopides (Carab.), une lignee subantarctique. [Rev. Franc. Ent.] 5: 1-55, ill., (Sk*). **Kaszab, Z.** — Die Arten der Gattungen Cnemeplatia und Psilachnopus (Tenebr. Opatrinae). [28] 59: 77-83, ill., (Sk*). **Mutchler, A. J.** — Coleoptera from the Galapagos Islands. [40] no. 981; 19 pp., ill. (*). **Paoli, G.**—Note sulla biologia e sulla filogenesi dei Meloidi. [Mem. Soc. Ent. Ital.] 16: 71-90, ill. **Wolfrum, P.**—Beitrag zur Kenntnis der Anthribiden. [2] 34: 67-76, (S). **Wusthoff, W.**—Uber die Praparation kleiner Kafer. [2] 34: 62-66.

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MOSAICS AND OTHER ANOMALIES AMONG ANTS. By WILLIAM MORTON WHEELER. Pp. 95, 2 pls. + 18 figs. Harvard University Press, Cambridge, Mass. $2.00—The manuscript for this handsome volume was completed by Professor Wheeler just a few days before his death. In it there are revealed again the brilliant analytical mind and the exhaustive detailed knowledge of ants that were Wheeler's. The occasion for this book was the discovery by Dr. Neal Albert Weber, a student of Professor Wheeler's, of two colonies of ants containing large numbers of anomalous individuals. One of these colonies, that of a large Cryptocerine, containing 4000 gynandromorphs has not yet been studied. The other colony, that of a fungus-growing (Attine) ant, *Acromyrmex octospinosus* Reich, forms the principal subject of the present volume.

In Part I (pp 3-18), the distribution, habits and normal castes of *Acromyrmex* are carefully described and new observations are recorded on fungus gardens in artificial nests. Part II (pp 18-34), is given to a detailed description of the entire personnel of the *A. octospinosus* colony taken in Trinidad, consisting of about 8000 normal individuals including 175 females, 660 males and the rest workers of the three castes, minor media and major. In addition there were 164 anomalous individuals. Of these, 106 were females and workers, belonging to three different "mutations." There were also 10 gynandromorphs (male-female mosaics), 46 gynergates (female-worker mosaics) and 1 diploergate (major and media worker mosaic), all believed to be the progeny of one of the mutant females. In the gynandromorphs the female component is confined to a portion of the head while the body is that of a normal male, except in one specimen which had abnormal genitalia. In the other types of mosaics it is again found that one of the components is nearly always limited to a portion of the head.

Part III (pp 35-65) considers the origin of the new types of mosaics and also of those mosaics which have already appeared in the literature, including mosaics with a soldier component (dinergatandromorphs and dinergatogynes) and those having an ergatogyne and a male component (ergatogynandromorphs). As regards the determination of the sexes, it is well established for ants as for honey-bees that the males develop parthenogenetically, while the females develop from fertilized eggs. In honey-bees it is known that the female castes (worker and queen) are determined by differential feeding of the larvae (trophogenic determination). As regards the determination of the castes in ants, Emery always maintained that it was also trophogenic, while others, such as Forel, have favored the idea

that the castes are already determined in the egg and that there is a genetic difference between the castes (blastogenic determination). Wheeler states that he himself was for a long time "on the fence" in this controversy, until his studies on these mosaics won him over to the blastogenic side. The evidence he presents for this theory is based on careful comparative studies of the morphology of all the normal castes in many different groups of ants, on anomalies, including the parasitogenic ones, on the nursing and feeding behavior within ant nests and, finally, on mosaics. As to mosaics, Wheeler points out that true sex mosaics (gynandromorphs) admittedly contain two sorts of genetically different tissues making up respectively the male and the female components of the mosaic. If this is true, then caste mosaics must also be made up of two sorts of tissues which are genetically different. In a gynergate, for example, both female and worker tissues must be present. And since mosaics between the subcastes also exist (diploergates), these subcastes too must be genetically different. And so Wheeler has concluded that all the castes and sub-castes have a blastogenic origin. However, in spite of the clear and exhaustive presentation of these data on mosaics and of all other available evidence, one still feels, in the end, that additional evidence, especially evidence of an experimental nature will be necessary to really demonstrate that determination is blastogenic. (In this connection attention is called to P. W. Whiting's review and discussion of Wheeler's book in the Journal of Heredity, 29: 189-193, May, 1938, in which alternative explanations of ant mosaics are proposed). Other valuable features of Professor Wheeler's book are: the taxonomic notes on the species (Appendix A); the revision of the known non-mosaic anomalies, both the parasitogenic and the non-parasitogenic, which gives the history and synonomy of the often confusing terminology of these forms (Appendix B); and finally, the bibliography on castes and anomalies.

R. G. SCHMIEDER.

RECENT ADVANCES IN ENTOMOLOGY by A. D. IMMS, Reader in Entomology, University of Cambridge. Second Edition. With 94 illustrations; Philadelphia P. Blakiston's Son & Co. Inc. 1937 x + 431 pp. $5.00. The first edition of this work appeared in 1931, occupied viii + 374 pages and was reviewed by Prof. Cockerell in the NEWS for July of that year. The number of chapters, their titles and most of the subdivisions in the new edition are the same as those in its predecessor. Some subjects whose inclusion might have been expected, as insect physiology, insects and climate, general morphology, insects

and plant viruses, have been omitted because they "have already formed the subjects of recent books or monographs." Much revision has been made in those chapters dealing with head segmentation, genitalia, musculature, homologies of appendages, hormones in metamorphosis, paleontology, response to visual stimuli, stimulatory organs, biological races and biological control. Prof. Cockerell's remark concerning the first edition applies, of course, to this second: "He [Dr. Imms] has chosen the most significant lines of advance, and has recorded an astonishing number of observations and discoveries, often in fields which were hardly explored until very recently." One can not read this "astonishing number" without being impressed by the fact that the conclusions reached by different investigators of the same topic, whether it be morphological physiological, paleontological or ecological, are in many cases still so divergent as to require much more study, observation and experimentation before agreement is attained. This condition of entomology—not peculiar to it—makes this book particularly valuable to all dealing with this science, and should serve as a warning to avoid dogmatism on disputed subjects.

P. P. Calvert.

Rocky Mountain Conference of Entomologists

The fourteenth Rocky Mountain Conference of Entomologists will be held at the University of Wyoming summer camp, Centennial, Wyoming, August 14-19, 1938. As in the past the arrangement will be such that members of the family can be comfortably cared for at the Camp and enjoy an outing while the meetings are under way. The University of Wyoming summer camp is located in the Medicine Bow National Forest about 40 miles west of Laramie, Wyo., and 100 miles north and west of Fort Collins, Colo., at an elevation of approximately 9500 ft. The Camp consists of a large recreation and dining hall, two lecture and laboratory buildings and a number of cabins equipped to accommodate three persons in each cabin. All meals and bedding will be furnished at a reasonable cost at the Camp. The Medicine Bow Mountain area is noted for its rugged scenery and good trout fishing. The nearby streams, lakes and mountain meadows furnish excellent high altitude insect collecting. Reservations should be made with the Secretary well in advance. Detailed information in regard to the final arrangements will be sent to those indicating they are interested in attending. Let us have your topics for discussion at an early date.

Geo. M. List, Sec., Colorado State College, Fort Collins, Colorado.

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Hemileuca maia in Flight (Lepid.: Saturniidae).

By Alex K. Wyatt, Chicago, Illinois.

An outstanding incident in a collecting experience covering over forty years of active work, was recalled in going over some notes of former years. Sunday, October 16, 1921, was one of those wonderful autumn days that make one feel good to be alive and able to enjoy the beauty and carefree spirit of the great out-doors. Temperature recorded for the day ranged from fifty-six degrees at 9:00 A. M. to sixty-five at noon and seventy-three at 5:00 P. M. and it was warmer in the sunshine. To take advantage of the day, I took the family on a scouting trip for new collecting grounds, to the south and southeast of the city. Friend Emil Beer joined us. We drove south some thirty miles to Lincoln Highway, then east through Dyer, Indiana, to Schererville, Indiana, which we reached about noon. Here we turned north, planning to stop at our old stamping grounds at Hessville, Indiana, to investigate collecting possibilities in the vicinity.

Just out of Schererville, we ran into them; *Hemileuca maia* by the hundreds, flying across the fields in every direction as far as one could see. We stopped by the roadside at once, unlimbered the nets and went to work. After capturing a few specimens, I surrendered my net to the older daughter, age eleven, and was kept busy caring for the moths as she and her younger sister, age six, brought them to me. The younger girl picked the moths from the tall grasses and shrubbery with her fingers and as may be imagined, these were mostly females. I can still visualize the youngster, coming toward me with a moth in her fingers and five or six males following, hovering closely around her hand and forearm. For a period of about two hours from noon until two o'clock the moths were flying

in great numbers. They flew high as a rule, thirty to fifty feet up and seemed to have business in the next county, but in the field where we were, many flew low enough to be captured, doubtless attracted by the females just emerging there. It was extremely interesting to see how madly the males sought the females; they literally fought each other in their eagerness. In one instance, we saw a tumbling ball of eight or ten moths with a dozen or more on the wing nearby, and upon investigation, found two females in the center of the ball. Copulation is effected almost instantaneously if there is no interference, whereupon the attraction for other males soon ceases. Looking across the field it was easy to spot the females by observing the males hovering about them. After two o'clock, flight practically ceased, the moths became scattered and many males were found at rest.

There was no great variation among over one hundred and forty specimens which we captured on that occasion, except in the width of the white band, which was narrow and almost entirely absent in some specimens and fully a quarter-inch wide in others. I took one unusual specimen, a male, in which the fringe of the primaries was white instead of the customary black color. We also found several egg masses, banded around twigs of willow. Records from eastern states usually give oak as the food plant of *Hemileuca maia*. Here, we never find the larva on oak, though it is plentiful in the vicinity, and willow is definitely the preferred food plant.

Never before, nor since, have we seen such a flight and the experience will remain vivid in our memories for many and many a day, and the nice little series of *Hemileuca maia* in our collections, will serve to refresh that memory.

An Annotated List of The Butterflies of Nebraska (Lepid.: Rhopalocera).

By R. A. Leussler, Omaha, Nebraska.

(Continued from page 80.)

35. D. berenice (Cram.) race strigosa (Bates). Rare. One each from the following localities: Roca, May 10, 1911 (Leussler); McCook, June 20, 1913; Lincoln, August 10, 1913 (R. W. Dawson); West Point (no date); Mitchell August 19, 1916 (C. E. Mickel).

36. Enodia portlandia (Fabr.). Not rare in the state but rather local. Colonies usually found at the edge of timber near a stream. Two broods, first in June, second in August. Has been taken as far west as Oconto.

37. Megisto cymela (Cram.). Common; single brooded, appearing late in June. Apparently found over the entire state. Specimens from Omaha, Lincoln, Rulo, Oxford and Harrison.

38. Satyrodes eurydice (Joh.). A few were taken by me in the canyons near Harrison, Sioux County on July 1, 1911. E. A. Dodge reported it as being quite common in the low lands near Fremont in the 80's.

S. eurydice race fumosus Leussler. This dark giant race has thus far been found in but one locality, a spring-fed marsh near Omaha, where formerly it was abundant. Unfortunately, the marsh was drained and otherwise disturbed some years ago, since which time none of the butterflies have been found.

39. Coenonympha inornata Edw. Found so far only in the vicinity of lakes in the sand hill region of Cherry County. A series of 6 specimens collected there June 4 to 7, 1914, and 2 on June 10, 1929. These are race *benjamini* McDunnough.

40. C. ochracea Edw. Taken abundantly near Harrison on numerous occasions in June. Has also been taken at Emmett in June, 1900, (Wolcott).

41. Neominois ridingsi (Edw.). Fairly swarmed on the high plains near Harrison, June 16 to 30, 1911. It is clearly double brooded, for fresh specimens in abundance were found

in the same locality on August 17 of the same year. It is quite variable, some specimens, especially of the later brood, resembling *dionysus* Scud. in size, and in having the eye spots larger, ground color at base lighter, and sharper dentation of the medium band of the secondaries. In June, 1933, a number were taken at Kimball.

42. Cercyonis alope race olympus (Edw.). Common; very variable; the form most commonly found in the state is Edwards' *olympus,* but some specimens found in and around Omaha are very similar to eastern *nephele.* Others have the yellow band so well developed as to approach somewhat closely typical *alope,* and there are intergrades of every degree. I have seen no typical *alope* in the state but it would not be surprising if it were found in the southeastern part. It is recorded from Nebraska City in a list published by Albert Cassel in 1894, and also included in H. G. Barber's list.

43. C. meadii (Edw.). This handsome species is common at Harrison and Harrisburg throughout August. No doubt its habitat extends also to other localities, though at present no further records are at hand.

44. C. oetus (Bdv.). Specimens collected in Squaw Canyon, July 20, 1892, and along Prairie Dog Creek July 2, 1901, are in the University collection. Both localities are in Sioux County near the town of Harrison.

45. Oeneis uhleri (Reak.) race varuna (Edw.). Common on the high plains of Sioux County in May and early June. Extremely variable in the depth of ground color, number of ocelli and distinctness of band on under side of secondaries. Some specimens, on characters, would have to be referred to typical *uhleri.*

46. Colaenis julia (Fabr.). Included in this list on the strength of a single specimen taken by Mrs. W. B. Graham in her garden at Omaha in September, 1908, and now in the writer's collection. The specimen is somewhat rubbed but the colors are fresh, and it is not tattered as if it had traveled a long distance. This suggests the possibility of its introduction

as larva or chrysalis. The dark band on forewing, extending from costa to outer margin, is complete and the apex of this wing also is well marked with fuscous. It apparently does not belong to the race *nudeola* Stichel.

47. DIONE VANILLAE (L.). Rare. A number of larvae (60 or 70) found feeding on passion vine at Omaha by F. H. Marshall, and some of them reared to maturity. A nice fresh individual observed at Lincoln, July 28, 1912 (R. W. Dawson), One specimen collected at Omaha, July 5, 1924; another October 15, 1928; and one at Plattsmouth, July 23, 1936 (Leussler).

48. EUPTOIETA CLAUDIA (Cram.). Common everywhere in the state; on the wing in every month from May to October, but fresh specimens are most numerous in July and September, indicating at least two broods.

49. ARGYNNIS IDALIA (Dru.). Common, especially in the eastern part of the state. Can be found from the middle of June till the middle of September, although there is but one brood.

50. A. CYBELE (Fabr.). The common Argynnis in the eastern part, but extending over the entire state; single brooded, its season being about the same as the foregoing. Specimens from the western part of the state are smaller, and have less heavy shading in the basal area.

51. A. APHRODITE (Fabr.). The typical form is rare, but has been taken at Omaha (Marshall), West Point (Univ. coll.), Oconto (Leussler), Bazile Mills (Shoemaker). Towards the west it grades into race *cypris*.

A. APHRODITE race ALCESTIS (Edw.). Rare, excepting in the northeastern part of the state. Two specimens from Omaha (Leussler), 4 from Lincoln, and a series from Bazile Mills (Shoemaker).

A. APHRODITE race CYPRIS (Edw.). This small red race is rather common in the canyons of Sioux County, long series having been taken there at various times. Like most Argynnids it is variable, and intergrades towards typical *aphrodite* are not uncommon.

52. A. HESPERIS (Edw.). Rare. There are in the University collection 4 specimens taken in Sioux County by Merritt Cary in July, 1901.

53. A. NEVADENSIS Edw. race MEADII (Edw.). Rare. A few fresh specimens were taken in Monroe and Warbonnet canyons, Sioux County in June, 1911. Other specimens in the University collection, from the same locality bear date labels July 1892.

54. A. EDWARDSII (Reak.). This was the commonest Argynnid in Sioux County in June, 1911, and altogether more than 50 specimens were taken, (Leussler). Others were taken at Mitchell, June 26, 1913 (Gates).

55. A. PLATINA (Skin.). A few specimens were taken in Sioux County June 27, 1911; also some in earlier years.

56. A. HALCYONE (Edw.). Taken in fair numbers in June, 1911. Abundant in the same locality in July, 1917, on alfalfa. Variable in the depth of ground color of basal area on under side of secondaries.

57. BRENTHIS MYRINA (Cram.). Found in many parts of the state in moist meadows. In the eastern part of the state there is found a race very considerably larger than those from other sections, measuring in the case of males 20 to 21 mm. from center of thorax to apex of wing, and 30 mm. in the case of females. To this race Dr. Holland has given the name *nebraskensis*. A male is figured in the revised Butterfly Book.

58. B. BELLONA (Fabr.). Apparently found only in the northeastern part of the state where it is not common. Three specimens were taken at Crystal Lake near Dakota City, May 14, 1910, (A. W. Lindsey), and Dodge reported taking a few specimens around orchards in Dodge County.

59. EUPHYDRYAS BERNADETTA (Leussler). Very abundant along the canyon rims in Sioux County in late May and early June. Easily captured when feeding on flowers. It is a race of *anicia* and is probably the most easterly representative of that species.

60. MELITAEA ACASTUS (Edw.). Specimens have been taken

near Harrison, Sioux County, but it apparently is rare, for I have seen but 2 specimens from there, 1 taken July 21, 1901, by Merritt Cary, and at present in my collection.

61. M. POLA (Bdv.). Far more common in Sioux County than the preceding species. I have taken many specimens there in June, 1911, 1917 and 1919. It, no doubt, inhabits other localities in western Nebraska.

62. PHYCIODES ISMERIA (Bdv. and Lec.). Found over the entire state, and at times very abundant; at least two broods, possibly three. Larvae feed on small wild sun-flower and are easily reared. The type, a beautiful melanic form, described by Cary and named *nigra* by him is in the University collection. It was collected in Sioux County, June 10, 1901.

63. P. NYCTEIS (Dbldy & Hew.). Common at Omaha and Lincoln. I have not found it very far west in the state. Two broods, June and August.

64. P. VESTA Edw. form AESTIVA (Edw.). A single specimen, Omaha, July 14, 1912.

65. P. GORGONE (Hbn.) A single male, Fremont, May 30, 1921.

P. GORGONE form HIEMALIS (Edw.). A fine fresh female, near Omaha, October 16, 1920.

66. P. THAROS (Dru.). Very common everywhere in the state. Middle of June till freezing weather. Subject to more or less variation.

P. THAROS form vern. MARCIA (Edw.). Common over the entire state, but less so than the summer form. May, and a few late in the fall.

67. P. BATESI (Reak.). This seems to be the common Phyciodes in the Sioux County canyons, where I have taken it in numbers, several years, in the month of June. Specimens match up well with specimens from Aylmer, Quebec, received from Dr. McDunnough.

68. P. PICTA (Edw.). Apparently rare in the state, only 2 having been taken of which I have actual knowledge; June 30, 1913 (L. M. Gates); Wauneta, June 21, 1933 (Leussler).

May be more abundant than we think, for on June 22, 1933, it was found in considerable numbers at Ft. Morgan, Colo., not more than 90 miles from the Nebraska line.

69. ANTHANASSA TEXANA (Edw.). Occasional. 1 specimen on each of the following dates: March 27, 1910 (F. H. Shoemaker); September 14, 1911; July 7, 1914; September 26, 1914; October 15, 1928; 4 specimens September 18, 1928; and 2 on September 22, 1928 (Leussler), all at Omaha. Apparently making an effort to establish itself.

70. CHLOSYNE LACINIA (Gey.) ADJUTRIX Scudder. One fresh specimen, Omaha, October 15, 1920, captured on flowers of marigold in a city garden. Possibly introduced as larva or chrysalis.

71. POLYGONIA INTERROGATIONIS (Fabr.). Common; extends over the entire state but is most abundant in the eastern part.

P. INTERROGATIONIS form FABRICII (Lint.). Most of the individuals of the fall brood belong to this form. As a rule, more abundant than the summer brood.

72. P. COMMA (Harris). Common; September till freezing weather, when it hibernates and flies again in the spring. Specimens from Omaha, Lincoln, Roca, Cedar Bluffs.

P. COMMA form DRYAS (Edw.). Not nearly as common as the preceding. June and July. Specimens from Omaha and Lincoln.

73. P. SATYRUS (Edw.). Taken only in the canyon region of Sioux County as far as known. Several were taken there in Sow Belly Canyon in June, 1911.

74. P. ZEPHYRUS (Edw.). This species also has been recorded only from the canyons in Sioux County, where it was quite abundant in the latter part of June, 1911.

75. P. PROGNE (Cram.). Although I have taken this species only in the canyons of Sioux County, where it was common in late June, 1911, it has been recorded by W. L. Carpenter from Ft. Niobrara, at Valentine, and from Nemaha County by W. E. Taylor, according to Barber's List.

(To be continued.)

Ichneumon Hibernation in The Northeastern United States. (Hymenoptera, Ichneumonidae).

By HENRY K. TOWNES, Jr., Dept. of Zoology, Syracuse University.

The genus *Ichneumon* (in the broad sense) is represented in the Northeast by over two hundred species. They are rather large ichneumonids with a short ovipositor and an abdomen that is not compressed. The genus is also known in this country under the name *Amblyteles.*

In November of 1935, Mr. R. H. McCauley, Jr., and one or two other students at Cornell University called my attention to the occurrence of large numbers of female *Ichneumon* in rotten logs in the valley of Six Mile Creek at Ithaca, N. Y. A few days later, two hours spent digging into rotten logs at the reported locality produced about ninety specimens representing six species. Since then searches in the vicinity of Ithaca, N. Y.; South Hadley, Mass. (M. C. Townes); Syracuse, N. Y. (H. K. and M. C. Townes); and Buena Vista, Pa. (R. H. McCauley, Jr.); have resulted in the finding of several hundred specimens representing about twenty-five species of *Ichneumon.* Those species that have been determined are *Ichneumon ultimus, centrator, cincticornis, leucaniae, scelestus, funestus, canadensis, fuscifrons, heterocampae, devinctor, confirmatus, maius* (?), and *rubicundus.* The species are listed in order according to their abundance.

The species found hibernating are not closely related. Those reported above belong to the groups known as *Spilichneumon, Craticlmeumon, Stenichneumon, Pseudamblyteles, Chasmodes* (?), *Barichneumon,* and *Ichneumon* in the strict sense. The last named group is represented by the largest number of species. The species that hibernate are those of which the males and females are on the wing in September and October. They mate in the fall, the males die, and the females hibernate and emerge in the spring to oviposit. In central New York, most of the females are probably in hibernating quarters about November 1 and remain there until about April 25, after which

they may be seen flying and crawling about on warm days. Not all of these species common in the fall have yet been found hibernating, neither have some of those that can be collected in early spring as adults (females). The first generation males of *Ichneumon* appear in the spring about May 25, and it is certain that females collected in early May passed the winter as adults.

Searching for hibernating *Ichneumon* is often an unproductive task, as the standards used in their choice of hibernating quarters are very exacting and difficult to learn. A great deal of time may be spent pulling off bark and digging into logs without finding a single specimen. When a specimen is found, however, there are usually many others in the same log or stump, and other suitable places in the neighborhood are likely to be productive. Wood of exactly the right moisture content and stage of decay seems to be necessary, but there are apparently other factors that influence the choice. Perhaps a gregarious instinct induces so many individuals to choose the same log.

The various species are found in different types of places. *Ichneumon centrator, scelestus, devinctor,* and sometimes *cincticornis* are found just beneath the loose bark of large logs in which there is a layer of soft debris between the bark and the sounder wood. These species occur singly, each in a small space that has been cleared out. *Ichneumon ultimus, leucaniae, funestus, canadensis,* and *heterocampae* are found in rotten logs and stumps in the empty tunnels of beetle larvae or carpenter ants, usually two to four inches from the surface and always in groups. The groups number from about three to twenty individuals and often contain several species. *I. cincticornis* occurs also in logs and stumps, but is usually nearer the surface than the above species and often singly. Two specimens of *I. confirmatus* were taken from a punky log covered with a heavy coat of moss and were rather near the surface. *I. fuscifrons* and *maius* (?) were also taken from rotten logs or stumps. Several specimens of *I. ultimus* were found by Mr. Victor Tiship deep down in grass tussocks and a single

specimen of *rubicundus* was collected from under a stone by Dr. Henry Diterich. The only other ichneumonid found hibernating was a female *Orthocentrus* in a stump.

It is noteworthy that the black species occur under bark, while the red and black ones (except *devinctor*) are found deeper in rotten logs. It seems, also, that those hibernating deeper in logs have, on the whole, a shorter and stouter build. The probable reason for this is that the stouter species (usually red and black) habitually crawl under leaves and other debris in search of hosts, while the more slender species do not have these semi-burrowing habits. With the approach of cold weather, it is natural that the species with the stronger inclination and better equipment for burrowing should push deeper into the decaying wood.

Seyrig, in an interesting paper on the hibernation of female ichneumonids in Europe, (Ann. Soc. ent. France. (1923) 1924 92: 354-362) reports the occurrence of sixty-two species found hibernating. Most of these belong to *Ichneumon* in the broad sense, but twenty are Phaeogenini, four Cryptinae, and one *Pimpla*. His rather extended observations agree with mine. He finds ichneumonids hibernating under moss and in grass tufts, as well as under bark, each type of locality protecting a different set of species. Probably after searches in a variety of places, a large number of our own ichneumonids of the subfamily Ichneumoninae will be found to hibernate as adults.

Coccidula suturalis synonymy. (Coleop.: Coccinelidae.)

By H. R. Dodge, Ohio State University.

In the summer of 1937 the writer collected a series of a *Coccidula* species by sweeping in a marshy swale at Itasca Park, Minnesota. The specimens agreed very well with Horn's description and figure of the western *occidentalis*. An attempt to discover their relationship to the eastern *suturalis* Weise revealed the following facts.

Weise (Ann. Ent. Soc. Belg. 39: 132) described *suturalis*

in March, 1895, considering it to be a variety of *lepida.*

Horn (Trans. Amer. Ent. Soc. 22: 114) described *occidentalis* from Wyoming and Vancouver in May, 1895.

Reitter, 1897, (Wien. Ent. Zeit. 16: 127) described *Coccidula suturalis* N. Sp. from Irkutsk, Siberia.

Weise, 1898, (Arch. Naturges. 64: 238) states that *occidentalis* is a synonym of *suturalis* Weise.

Casey, 1899, (Journ. New York Ent. Soc. 7: 163) states the synonymy upon the authority of Weise and records *suturalis* from Ohio.

Leng, 1920, (Catalogue of the Coleop. of America N. of Mexico) lists both *suturalis* and *occidentalis* as good species.

Korschefsky, 1931, (Coleop. Catalogus: Coccinellidae) considers *suturalis* Weise an aberration of *lepida,* and *suturalis* Reitter and *occidentalis* good species.

Specimens in the Wenzel collection at the Ohio State University, under the name *C. occidentalis,* are represented from New Jersey and Edmonton, Alberta. The eastern and western specimens are conspecific, and the Minnesota specimens are similar to them. This points to a continuous distribution of the species from Vancouver Island to New Jersey, and bears out Weise's statement of synonymy, which had been disregarded or overlooked by Leng and Korschefsky.

The correct name of the species in question is, therefore, *Coccidula suturalis* Weise, this name having priority over *C. occidentalis* Horn. *Coccidula suturalis* Reitter nec. Weise I shall designate as **Coccidula reitteri** new name.

In both of his articles Weise expresses the belief that *suturalis* is merely a variety of *lepida.* Frost, 1920, (Can. Ent. 52:231) records the species from Orono, Maine, and notes a color variation of the abdominal sternites towards the *lepida* type. However, a complete intergradation of coloration is not recorded. I favor retention of specific rank for *suturalis* upon this point, plus the facts that *suturalis* and *lepida* apparently have never been found in association, and *suturalis* has a much wider distribution.

Notes on Florida Odonata.

By E. M. Davis, Rollins College, Winter Park, Florida.

During the past four years (1934-1937) I have collected dragonflies at various places in the southern half of Florida and it has frequently happened that interesting species have been found.

On Merritt's Island, east of Titusville, and at the southern end of Mosquito Lagoon, one of the commonest dragonflies in the fall is *Macrodiplax balteata.* I do not know its status earlier in the year but in October and November it has been abundant. It is found in the brackish marsh area where *Erythrodiplax berenice* is also abundant. *Macrodiplax* is watchful and quick, perching on the tops of weeds and bushes, and sufficiently numerous so that a good number can be caught in a short time. I have found this same dragonfly in large numbers in April about 10 miles after leaving Royal Palm Park on the road to Flamingo, and it was abundant until within about 10 miles of the settlement, which is at the southern tip of the mainland of Florida. It is also found in April on the upper Keys.

Sympetrum corruptum occurs sparingly on Merritt's Island in the brackish marsh area; I have caught two and seen several others.

Brachymesia gravida is an abundant species around lakes or canals in many places in the southern half of Florida, where it is found during all the warmer months. I have found it wherever *Macrodiplax* occurs and in many other places as well; it is one of the most common dragonflies in southern Florida.

Lepthemis vesiculosa was found around some small pools on Lower Matecumbe Key in April, 1937. In the field it looks very much like a large *Erythemis simplicicollis.* They rested on rocks, grasses, or bushes, and while watchful were not fast or high fliers, and kept close to their small pools, in which the females were laying by dipping the abdomen quickly into the water. They were not easily frightened, even when we missed

them with the net, and should be rated easy to catch. While in a boat, following the water lanes through the small mangrove keys off of Upper Matecumbe Key, I passed close by two of these and they were so indifferent to us that only the absence of my net prevented their certain capture.

A great contrast to *L. vesiculosa* is the smaller and much more active *Orthemis ferruginea*. Pugnacious, alert, and fast, they keep close to the edges of large ponds, but at the small pools on the Keys flew anywhere over the water and not far above it. When old, the pruinosity of the males makes them a most striking and peculiar red-violet, but when young the abdomen is brilliant red. To see them racing over a small pool, fighting everything in their way, is a great sight for anyone who appreciates dragonflies, and for each one caught many are missed. The brown females laid their eggs with quick dips of the abdomen while the male stayed a foot or so above. It has often been suggested that in nature females are frequently dull-colored compared with males, because it affords them protection from predators. In the case of *Orthemis* on this occasion on the Keys, two of us collected around several pools for over an hour, and later (and too late!) it was discovered that while we had taken males and females of several species, we had caught *only* the brilliant males of *Orthemis!*

Tramea onusta was also on the Keys in April. Several pairs were seen and some singles and pairs were caught. They were free flying, going over land or water, and keeping well up in the air. I have caught one other of this species not far from the St. Johns River about 20 miles west of Melbourne. All species of this genus except *T. carolina* are apparently scarce in southern Florida.

Of the damselflies, *Enallagma durum* was found at some small shallow waterholes in open woods near the St. Johns River about 20 miles east of Winter Park. This was in March and April 1937, and they were common at that time and place.

At one of these water holes I found some pale-blue and black damselflies which could not be identified at sight and to my surprise turned out to be both males and females of *E. pollu-*

tum. This is one of the most abundant species in Florida, but all except these have always been the usual brown and black.

The scarcity of damselflies between Royal Palm Park and Cape Sable, and also on the Upper Keys, has been very noticeable. Except for a glimpse of one blue and black *Enallagma* I have seen nothing but *Ischnura ramburii* and these are uncommon.

A List of Dragonflies (Odonata) taken in Southern Alaska.

By Carsten Ahrens, The McKeesport High School, McKeesport, Pa.

For 41 days of last summer, July 1—August 10, 1937, the writer collected dragonflies in southern Alaska. It was his misfortune to visit this United States possession during the coldest and wettest summer that that territory has experienced in twenty years. The temperature never rose above 60° F. With the exception of three days, rain fell almost constantly throughout the trip. Collecting was frequently discouraging. For instance, during the five days spent at Ketchikan, the first Alaskan port of call on the way north from Seattle, rain rarely ceased to fall; only five specimens, stiffened with cold, were taken, and those were "picked" from the vegetation that grows jungle-like in that humid region.

A total of 426 specimens, representing 20 species were taken. 6 are included here for the first time in any list of Alaskan Odonata: *Aeschna interrupta lineata* Walker, *Sympetrum decisum* Hagen, *Leucorrhinia proxima* Calvert, *Leucorrhinia borealis* Hagen, *Lestes dryas* Kirby (*uncatus* Kirby), and *Agrion resolutum* Hagen (genus *Coenagrion* of Needham and Hayward).

Mrs. L. K. Gloyd of the University Museum of Ann Arbor, Michigan, checked the identifications. Her invaluable help has made possible the following list.

1. Aeschna sitchensis Hagen 1 ♂ 2 ♀. Juneau, 8/5-8/6 (1 ♂ 1 ♀; Matanuska Valley 7/19 (1 ♀). Found these specimens in boggy meadows.

2. Ae. palmata Hagen 19 ♂ 5 ♀. Juneau, 7/11 (2 ♂), 8/5-8/6 (9 ♀ 4 ♀); Matanuska Valley 7/19 (2 ♂), 7/20 (6 ♂ 1 ♀). These insects were taken about lakes, especially Auk Lake, near Juneau.

3. Ae. interrupta interrupta Walker 1 ♂, Ketchikan, 7/8, Picked this dragonfly while he was at rest on a gaudily painted totem pole in the city's park.

4. Ae. interrupta lineata Walker 5 ♂ 11 ♀. Chitina, 7/28 (1 ♀); Matanuska Valley, 7/19/21, (5 ♂ 10 ♀). This aeschnid was flushed frequently as it rested on the new gravel roads in the Matanuska Valley.

5. Ae. eremita Scudder 24 ♂ 5 ♀. Anchorage, 7/22 (1 ♀); Chitina, 7/27 (1 ♂); Gulkana, 7/27 (4 ♂ 2 ♀); Matanuska Valley, 7/19-7/20 (19 ♂ 2 ♀). Common about the edges of lakes which they patrolled with surprising regularity.

6. Ae. juncea Linn. 38 ♂ 11 ♀. Anchorage, 7/17 (1 ♂); Gulkana, 7/27 (7 ♂ 1 ♀); Juneau, 7/11 (7 ♂ 1 ♀), 8/5-8/6 (9 ♂ 4 ♀); Ketchikan, 7/8 (1 ♂); Matanuska Valley, 7/19-7/21 (8 ♂ 2 ♀); Seward, 7/16 (4 ♂ 2 ♀); Valdez, 7/24 (1 ♂ 1 ♀). The commonest Anisopteron collected. It was taken in the vicinity of every place visited and about habitats that differed greatly from each other. At Seward it was the only species observed. At Juneau the females were ovipositing in floating logs in an old gravel pit.

7. Somatochlora albicincta (Burm.) 7 ♂ 1 ♂. Anchorage, 7/22 (1 ♀); Juneau, 7/11 (1 ♂); Palmer, 7/20 (6 ♂). Easily captured for they slowly fly a few inches above the surface of the lake while they investigate every twist of the shore line.

8. S. semicircularis (Selys) 9 ♂ 1 ♀ Juneau, 7/11 (8 ♂ 1 ♀), 8/5 (1 ♂). The males were captured in a boggy meadow just below the Mendenhall Glacier. The females were ovipositing in puddles which the rain had left in an oats field.

9. Cordulia shurtleffi Scudder 13 ♂ 1 ♀. Anchorage, 7/22 (8 ♂); Gulkana, 7/27 (2 ♂); Juneau, 7/11 (1 ♂); Matanuska Valley, 7/21-7/29 (2 ♂ 1 ♀). This species was taken along clear streams, lakes, and over muskeg.

10. Libellula quadrimaculata Linn. 4 ♂, Juneau, 7/11. These males were taken over a gravel pit which is situated on the very edge of the milky glacier silt-filled Mendenhall River. The water in the pit was clear.

11. Sympterum decisum Hagen 13 ♂ 7 ♀, Chitina, 7/28. Tenerals were emerging in large numbers at 10:30 A. M., in a densely reeded area on the edge of Willow Creek.

12. S. danae Sulzer 6 ♂ 5 ♀, Juneau, 8/5-8/6. Specimens were captured at low tide over the sedge flats near the ocean.

13. Leucorrhinia hudsonica Selys 6 ♂ 11 ♀. Chitina, 7/28 (1 ♀); Gulkana, 7/27 (1 ♀); Juneau, 7/11 (5 ♂ 6 ♂), Gold Cr. 7/12 (1 ♀); Ketchikan, (near Fawn L. & L. Ketchi-

kan) 7/5 (1 ♂ 2 ♀). All of the dragonflies of this species were collected on foliage near lakes with the exception of one female which was taken high in the mountains along swift Gold Creek, four miles from the ocean.

14. L. PROXIMA Calvert 5 ♂ 1 ♀, Anchorage, 7/22. These insects were taken at rest on the margin of a small lake three miles north of the town of Anchorage.

15. L. BOREALIS Hagen 1 ♂ 1 ♀. Anchorage, 7/17 (1 ♂); Gulkana, 7/27 (1 ♀). Mrs. L. K. Gloyd writes, "The 8th segment does not have the large red spot but nevertheless I believe it to be *borealis* and not *pectoralis*. Seg. 7 is proportionately longer and the vulvar lamina wider near the apex than in *pectoralis* ♀.

16. LESTES DISJUNCTUS Selys 45 ♂ 13 ♀. Anchorage, 7/23 (2 ♂), Taken in the rain by sweeping in a swampy tide flat. Gulkana, 7/27 (8 ♂ 1 ♀), Collected about a reedy lake along highway between Gulkana and Gakona. Juneau, 8/6 (3 ♂ 1 ♀), Found in boggy meadow just below Mendenhall Glacier. Matanuska Valley, 7/19 (2 ♂ 1 ♀ tenerals), 7/20 (30 ♂ 10 ♀), Drove out many from shelter in the rain-drenched weeds of a railroad embankment above a stagnant ditch.

17. LESTES DRYAS Kirby (*uncatus* Kirby) 13 ♂ 10 ♀, Chitina, 7/28. Numerous in swamps near roadside where many pairs were flying in tandem.

18. AGRION RESOLUTUM Hagen (genus *Coenagrion* of Needham and Hayward's Handbook) 39 ♂ 7 ♀. Anchorage, 7/17 (15 ♂ 3 ♀); Gulkana, 7/27 (7 ♂ 1 ♀); Matanuska Valley, 7/19-7/21 (17 ♂ 3 ♀). Found in reedy areas where fresh water was seeping into tidal flats and about small, shallow lakes.

19. ENALLAGMA BOREALE Selys 17 ♂ 10 ♀. Gulkana, 7/27 (6 ♂ 5 ♀); Juneau, 7/11 (2 ♀), 8/5-8/6 (4 ♂ 1 ♀); Juneau, Awk Lake, 7/11 (1 ♂); Matanuska Valley, 7/17-7/21 (6 ♂ 2 ♀).

20. E. CYATHIGERUM (Charp.) 38 ♂ 20 ♀. Juneau, 7/11 (6 ♂ 4 ♀), 8/6 (1 ♂ 1 ♀); Juneau, Awk Lake, 7/11 (11 ♂ 3 ♀); Matanuska Valley, 7/19-7/21 (20 ♂ 12 ♀). These Enallagmas were numerous about lakes and clear streams in the company of *boreale*.

A New Acmaeodera (Coleoptera: Buprestidae).

By Josef N. Knull, The Ohio State University,
Columbus, Ohio.

Acamaeodera vulturei n. sp.

♀.—Size and form of *A. varipilis* Van.D., ventral surface, head and pronotum bronze with bluish cast, elytra dark blue, each elytron with four irregular transverse spots, one back of base, another in front of middle and two back of middle, posterior two more or less connected.

Head convex, a well marked carina on vertex; surface coarsely punctured, pubescence long; antennae serrate from the fifth joint, second and third joints of equal length, together shorter than scape, fourth joint longer than third, joints five to eleven decreasing in length.

Pronotum wider than long, widest in front of base, wider at base than at apex; sides broadly rounded in front, more acutely rounded posteriorly; anterior margin sinuate, median lobe broadly rounded; basal margin truncate; disk convex, a slight trace of median depression, a lateral depression on each side at base; surface coarsely punctured, punctures separated by much less than their own diameters in middle, reticulate at sides, pubescence long.

Elytra wide as widest part of pronotum, sides constricted back of base, broadly rounded posteriorly to rounded apices; margins serrate from middle; disk convex, umbone prominent; surface coarsely punctured, punctures of interspaces very fine, a recumbent hair arising from each fine puncture.

Abdomen beneath densely coarsely punctured, a short recumbent hair arising from each puncture; last ventral segment without subapical modification; front margin of prosternum straight, sides not reaching front angles.

Length 6.5 mm.; width 2 mm.

Holotype collected in Vulture Mountains near Wickenburg, Arizona, June 16, 1937, by D. J. and J. N. Knull; *paratype* labeled Elizabeth Lake, California, July 10, both in collection of writer.

Variations.—The female paratype has the markings of the elytra broken up into elongate yellow areas.

This species belongs to the Truncata group according to Fall* and would come near *A. vanduzeei* Van D. Dr. Van Dyke has kindly compared a specimen with his type and found the two forms to be different.

* H. C. Fall, Jour. N. Y. Ent. Soc., viii, pp. 1-37, 1899.

Egg-Laying Among the Argynnids. (Lepid.: Nymphalidae).

By DR. EUGENE MURRAY-AARON, Field Museum, Chicago.

Nearly a half century ago, the late Dr. Henry Skinner and I published an Annotated List of the Butterflies of the Philadelphia District (Can. Ent. Vol. 27, p. 130 et seq.) in which we described several new varietal forms and also took occasion to reply to a characteristicly caustic critique that not long before had appeared in Scudder's Butterflies of the Eastern United States and Canada. In that, Mr. Scudder had written of the egg-laying vagaries of *Argynnis* (*Dryas*) *cybele* (Vol. 1, p. 560) as follows:

"The eggs are laid upon the leaves and stalks of the food plant and not, as stated by H. Skinner, dropped from a distance upon the herbage. * * * The butterfly has been seen to deposit its eggs in the ordinary manner and such a wide departure from the common rule must be disbelieved in until it has been seen repeated. If Mr. Skinner had seen the act more than once he would have said so. * * * Still it would be less surprising in this butterfly than in some others, as the caterpillar leaves its food plant on hatching and does not seek it until spring."

I, knowing Mr. Scudder well, even intimately, valuing him as a kind friend and adviser, several times his guest as he was mine knew him also as a very positive critic and therefore favored a more positive reply than my good-humored fellow author insisted on our making. As a consequence we were contented to quote our friend George Howard Parker, then Instructor in Zoology at Harvard, now Professor Emeritus thereof, and my brother S. Frank Aaron, stating that we authors had observed the same action on the part of *myrina* and *bellona* and that I believed I had observed the same some years before (1875 to '79) in the Smoky Mountains of Tennessee, on the part of *diana*.

To this Mr. Scudder made no reply at the time and my notes of those years show that I wrote him regarding the matter, with further testimony, without result. At that time I stressed

the argument not unnaturally based on his own hint as to feeding habits of *cybele* larvae, as stated in his last sentence above quoted.

It was no surprise to me to get no reply as I had had a printed controversy with him regarding the food of *Lycaena* (*Everes*) *comyntas* some years earlier—sixty-one years ago, to be exact—regarding which my friend Wm. H. Edwards had come to my rescue, without acknowledgement from Mr. Scudder. He, one of the most tireless and usually among the most exact of all naturalists of his day, did not take kindly to being corrected, even by the then high priest of the Rhopalocera, my valued friend Edwards.

All of this comes back to mind now, while engaged in the never ending puzzles that the Argynnids afford, in taxonomic work on the Strecker Collection at the Field Museum. This continually drives me to my own card catalog, started in 1873 and still in active growth, in which I have just come across several records regarding this vagarious proceeding on the part of some Argynnids. From them I find that I have since twice observed *diana* thus behaving, have noted the same of *idalia,* here in our Skokie meadows north of us, and have such repeated notes of *cybele* and *bellona* as well.

What can our many western collectors tell us on this subject? Comstock, Gunder, Grinnell and others should be able to testify.

The First Occurrence of Sphinx franckii Neum. in Pennsylvania. (Lepid.: Sphingidae).

On July 12, 1938, my parents, Mr. and Mrs. George S. Worth, caught a perfect specimen of *Sphinx franckii* Neum. at a light in one of the rooms of their home at Wayne, Pennsylvania. The time was about ten-thirty in the evening. The next day they gave it to me, and I presented it to the Academy of Natural Sciences of Philadelphia. The identification was made at once by Mr. John W. Cadbury, 3rd, of the Academy's Department of Entomology. This species of moth is very rare throughout its range, and the present record, according to Mr. Cadbury, is the first instance of its capture in Pennsylvania.

C. Brooke Worth, Department of Zoology, Swarthmore College, Swarthmore, Pennsylvania.

An Outbreak of Synnoma lynosyrana Walsingham (Tortricidae, Lepidoptera).

On August 12, 1937, the writer inspected an outbreak of lepidopterous larvae feeding on rabbitbrush (*Chrysothamnus* sp.) in Beaverhead County, Montana. The caterpillars, which were tying the foliage into compact clumps and producing a witches-broom effect, were found on a rangeland area 3-4 miles long and ½ mile wide. Ranchers in the affected area were concerned about the possible spread of the pest to economic crop plants.

Adults were reared and sent to C. F. W. Muesebeck, Division of Insect Identification, Bureau of Entomology and Plant Quarantine. Through the kindness of Mr. Muesebeck and Mr. C. Heinrich, the adults were determined as *Synnoma lynosyrana* Wlsm. The following distribution data were furnished by Mr. Heinrich:

"California: Sheep Rock (Siskiyou Co.), San Bernadino Co.

New Mexico: Springer, Koehler, Fort Wingate.

Colorado: Pike's Peak, (several specimens—no definite locality).

Arizona: Williams, Verde Valley, Douglas.

Montana: Jefferson Co., Beaverhead Co.

The type locality for the insect is the Mount Shasta region of California." (1879).

Specimens from the earlier Montana outbreak have been found (Jefferson Co., 1924). Larval specimens are deposited in the U. S. National Museum collection, and in the entomological collection of Montana State College, Bozeman, Montana.

Mr. Heinrich indicates *Chrysothamnus* as the only known food plant for this insect; the confirmation of this by the occurrence of an additional outbreak on the same host plant suggests that the tortricid may be restricted in its feeding to this rangeland shrub.

D. J. Pletsch, Montana State College, Bozeman, Montana.

An Old Joke about Bees.

The following appeared in the London *Times* of April 21, 1838:

> Some time since a person in the neighbourhood of Keswick, having several hives of bees to dispose of, and being desirous to attract purchasers, caused a placard to be printed announcing the sale, with the following extraordinary headlines:—"Extensive sale of live stock, comprising not less than one hundred and forty thousand head, with an unlimited right of pasturage!"

This joke has survived for a hundred years. I first heard it in New Mexico, where it was quoted to me as original.—T. D. A. Cockerell.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within** ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Bailey, S. F.**—Bells in memory of W. E. Hinds. [55] 14:96. **Barber, G. W.**—A study of the elliptical golden rod gall caused by Gnorimoschema gallaesolidaginis. [6] 46: 155-178, ill. **Bonnell & Bruzas.**—A method of collecting Amphizoa (Coleo.). [55] 14:112. **Crosby, C. R.**—Obituary by S. C. Bishop. [Festschr. 60. Geburtst. Strand] 4: 561-562, ill. **Hatch, M. H.**—Theophrastus of Eresos as an economic entomologist. [6] 46: 223-227. **Jobling, B.**—The cardboard cell method for the mounting of insects and their parts. [107] A, 13: 55-57, ill. **Monte, O.**—Manual do Colecionador de Insetos. [Chacras e Quintaes, Suppl., Mar. 1938] 49 pp. **Pyenson, L.**—The problems of applied entomology in Pernambuco, Brazil. [105] 8: 237-254, ill. **Snodgrass, R. E.**—Evolution of the Annelida, Onychophora, and Arthropoda. [Smiths. Miscel. Coll.] 97, no. 6: 159 pp. **Warren, B. C. S.**—The International Code of Zoological Nomenclature. [9] 7: 133-139. **Wilson, George Ringo.**—Obituary by H. M. Armitage. **Wusthoff, W.**—Ueber die Praparation kleiner kafer. [21] 34: 62-66.

ANATOMY, PHYSIOLOGY, ETC.—**Cooper, B.**—The internal anatomy of Corioxenos antestiae (Strepsiptera). [107] A, 13: 31-54, ill. **Fraser, F. C.**—A note of the fallaciousness of the theory of pretracheation in the venation of Odonata. [107] A, 13: 60-70, ill. **Harukawa & Tokunaga.**—Studies on the life history & bionomics of Phyllotreta vittata (Coleo.). [Mem. Coll. Agr. Kyoto Imp. Univ.] No.

44 (Ent. Ser. 5); 1-48, ill. **James, H. C.**—The effect of the humidity of the environment on sex ratios from over-aged ova of Pseudococcus citri (Hemipt., Coccid.). [107] A, 13: 73-79. **Jannone, G.**—Aspetti bio-morfologici e somatometrici dei problema delle fasi nel Daciostaurus maroccanus in Italia e fuori, con particolare alla provincia Napoli (Orth. Acrid.). [Boll. R. Lab. Ent. Agr. Portici] 1: 261-329, ill. **Kaszab, Z.**—See under Coleoptera. **Otter, G. W.**—On the morphology of the larvae of three spp. of Cecidomyidae from knapweed (Centaurea) flowers. [36] 87: 39-68, ill. **Paoli, G.**—Osservazioni sulla morfologia dell' estremo addome della femmina dei Ditteri Bombiliidi. [Redia] 23: 1-4, ill. Richerche sulla morfologia e anatomica del capo delle larve dei Ditteri Bombiliidi. [Redia] 23: 5-16, ill. Osservazioni su alcune particolarita di struttura e funzione dell 'apparato genitale femminile dei Dociostaurus maroccanus (Orth: Acrid.). [Redia] 23: 17-26, ill. Studi sulle cavallette di foggia (Dociostaurus, Orth., Acrid.), e sui loro oofagi (Ditteri Bombiliidi e Coleotteri Meloidi) ed Acari ectofagi (Eritreidi e Trombidiidi). [Redia] 23: 27-202, ill. **Querci, O.**—Effets des radiations reflechies sur les insectes. [Lambillonea] 28: 105-107. **Russo, G.**—V. Contributo alla conoscenza dei Coleotteri Scolitidi. Fleotribo: Phleotribus scarabaeoides. [Boll. R. Lab. Ent. Agr. Portici] 1: 3-261, ill. **Usinger, R. L.**—Dorsal abdominal scent glands in nymphs of Lygaeidae. [55] 14:83. **Whelan, D. B.**—Blood pulsations in Euxoa detersa (Noctuid.) [103] 11:109. **Woodruff, L. C.**—Observation on roach reproduction (Orth: Blatt.). [103] 11: 94-96, ill.

ARACHNIDA AND MYRIOPODA.—Jacot, A. P.—More Box-mites of the Northeastern United States. [6] 46: 109-145, ill. (k*). **Kaston, B. J.**—See under Small Orders, etc. **Keifer, H. H.**—Eriophyid Studies (Acarina). [Bull. Dept. Agr., St. Calif.] 27: 181-206, ill. (*). **Paoli, G.**—See under Anatomy. **Pratt & Hatch.**—The food of the black widow spider on Whidby I., Wash. [6] 46: 191-193. **Snodgrass, R. E.**—See under General.

THE SMALLER ORDERS OF INSECTS.—Banks, N.—Two n. gen. of Myrmeleonidae. [10] 40: 125-129, ill. New Chrysopidae & spp. new to the U. S. (Neuroptera. [54] 70: 118-122. (k). **Da Costa Lima, A.**—Uma variedade de "Rhopalopsyllus bohlsi" (Siphonaptera: Pulicidae). [Rev. Med-Cirurg. Brasil] 45: no. 2, Aug. 1937 [3-6]. ill.

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On the Designation of Generotypes by Fabricius.

In the NEWS for May, 1937, pages 130-134, was published an article by Mr. René Malaise, of the Swedish Museum of Natural History at Stockholm, entitled "Fabricius as the First Designator and Original Inventor of Genotypes." Of this Mr. W. L. McAtee, of the Biological Survey, U. S. Department of Agriculture, made an adverse criticism in the NEWS for October, 1937, page 230. Mr. Malaise has replied to Mr. McAtee in a paper "On the designation of generotypes by Fabricius. A response to McAtee," in *Entomologist Tidskrift,* Stockholm, Häft 3-4, 1938, pages 99-106, with fascimiles of four different pages from Fabricius's books, 1792, 1804 and of one page from Latreille's "Tables des Genres" of 1810. This paper originally prepared for publication in the NEWS, had to be withdrawn, much to our regret. Mr. Malaise kindly writes "Free copies will be sent to all who apply for one as long as the supply lasts. The Entom Tidskrift, 1938, 3-4 will probably not be distributed before the 18. XII. 1938." Mr. Malaise may be addressed at Naturhistoriska Riksmuseum, Entomologiska Avdelningen, Stockholm 50, Sweden. His paper is in English.

OBITUARY

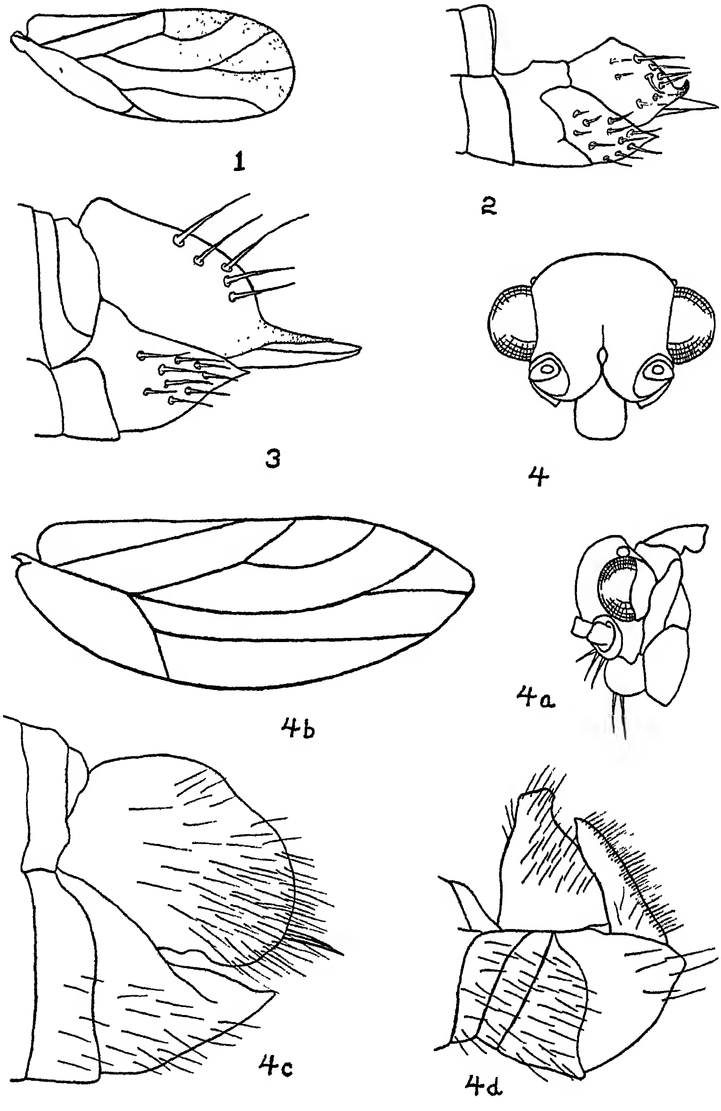
Science for July 22, 1938, said: Professor FERNANDO NEVERMANN, since 1909 [*sic*] professor of entomology at the National Agricultural School at San Jose, Costa Rica, was recently accidentally killed while searching for ants that had been damaging banana plants.

We are indebted to Prof. Anastasio Alfaro of San José for a clipping from the *Diario de Costa Rica* of July 5, 1938, giving details of this sad event. which we translate and abstract as follows:

Don Fernando Nevermann has lived for the past twenty years in our country and the Centro Nacional de Agricultura has benefited for some little time past from his valuable services with very satisfactory results, as Prof. Rafael A. Chavarria, Director of the establishment has assured us. A Cuban col-

league of Prof. Nevermann's arrived in Costa Rica to study certain material and the two gentlemen arranged to make a survey of the zone on the "Old Line" on which Prof Nevermann had a farm. On Thursday evening [June 30] they set out to examine the surroundings and investigate certain species which are abroad only in the darkness. To see their way they carried two small lights. In the house a son of Prof. Nevermann remained asleep. Nearby was a farm where lived a young man named Scott, very fond of hunting who, a short time before gave chase to a lion [puma]. He went to hunt this same night. The two entomologists kept their lamps lighted almost all the time. At a moment when they met to examine an anthill, Scott approached at some distance, mistook the lights for the eyes of an animal and, without waiting to be sure, fired two shots. At once a deep cry of pain arose from the two scientists wounded by the discharges. Scott ran up and the sorrowful spectacle of the tragedy met his eyes. Prof. Nevermann was seriously wounded, his companion also but less gravely. With great exertions on the part of Scott and of Prof. Nevermann's friend, the three returned to the house and arrangements were made to proceed to the hospital at Port Limon, where the two wounded men arrived the same night. The physicians exerted themselves to the utmost, but complications supervened and Prof. Nevermann died Sunday morning [July 3]. In accordance with the wishes of his relatives, his body was brought to the capital, where the funeral was held, and interred in the presence of a numerous company, the professors and students of the Centro Nacional de Agricultura and members of the German colony.

Prof. Nevermann had contributed papers on Coleoptera to *Entomologische Blätter* of Berlin (Eine neue *Statira* aus Costa Rica, 1926; Zwei neue Colydiiden aus C. R., 1930; Beobachtungen über die Lebensweise einiger Lamellicornier und einer Chrysomeliden, 1933; Berichtigung zum Cucujiidenkatalog, 1936) and to *Entomologische Rundschau,* Stuttgart (Winke zur Unterhaltung, und Präparation der Käfersammlung in den Tropen 1935), while his principal work appears to be his Beitrag zur Kenntniss der *Telephanus* (Cucujidae) in the *Stettiner Entomologische Zeitung,* 1931, 1932, embracing 119 pages and 8 plates. He collected insects of various orders in Costa Rica. He was 56 years of age at the time of his death.



PSYLLA NANA 1, TRIOZA SHEPHERDIAE 2, T. CHLORA 3, LEVIDEA LINEATA 4-4D.—TUTHILL

ENTOMOLOGICAL NEWS

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Some New North American Psyllidae (Homoptera).

By L. D. TUTHILL, Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

(Plate V.)

The writer has been working on a critical review of North American Psyllidae for the past two years. Some of the new forms encountered are described in this paper. The material is from the U. S. National Museum, the University of Kansas, and the author's collection. The writer would like to obtain as much North American material as is available and will gladly determine material in this group for the privilege of studying it.

Arytaina hirsuta n. sp.

Similar to *A. pubescens* in size and pubescence but reddish in color, wings reddish brown, genitalia quite distinct. Length to tip of folded wings, 2.00-2.25 mm.

Color: General body color, including legs, red. Head and thoracic dorsum with prominent white pubescence. Disc of vertex white, except medial line and two foveae black; antennae black at tip. Thoracic dorsum white, heavily marked with black and red; scutum definitely striped. Forewings reddish fumate, darker toward apex. Veins red.

Structure: Head deflexed, slightly broader than thorax. Discal foveae and medial suture of vertex very prominent. Postero-lateral portions of vertex, which bear ocelli, prominently raised. Genal cones quite sharp, pubescent. Antennae about one and one-half times as long as width of head. Thorax heavily pubescent, granular. Forewings twice as long as broad, coriaceous; pterostigma short and broad.

Genitalia: Male proctiger longer than forceps, narrow in lateral view; forceps longer than in *pubescens,* strongly curved inward, tapering to apices which bear small black hooks, the postero-medial margin with very heavy golden pubescence. Female genital segment short, constricted midway and very narrow to apex; dorsal valve slightly longer than ventral.

Holotype, male, *allotype*, female, two male and fourteen female paratypes, Lapine, OREGON, July 2, 1935, P. W. Oman; other paratypes as follows: one male, Klamath, Ore., July 1, 1935, one female, Bend, Ore., July 2, 1935, P. W. Oman; one female, Lapine, Ore., July 2, 1935 and one female, Reno, NEVADA, June 26, 1935, R. H. Beamer.

Holotype, allotype and paratypes in U. S. National Museum. Paratypes in Snow Collection, University of Kansas, and author's collection.

Psylla nana n. sp.

(Plate V, Fig. 1.)

Resembling *Psylla minuta* but the forewings definitely maculate, the vertex and thoracic dorsum not pubescent and the genal cones much smaller. Length to tip of folded wings, 2.00-2.25 mm.

Color: General body color, including legs, dirty white, with orange markings. Vertex white with margins, median line and discal foveae orange; genal cones white; antennal segments dark on apices, last two segments black. Thoracic dorsum with a median orange line, a pair of broader orange stripes on each side of scutum. Forewings more or less fumate in basal half; membrane whitish with somewhat irregular brown maculae as illustrated; veins white.

Structure: Head of median size, vertex bulging forward between antennae, with medial suture and discal foveae prominent. Genal cones small, short, blunt, somewhat pubescent. Antennae about twice as long as width of head. Thorax relatively flat. Forewings two and one-third times as long as broad, broadly rounded; pterostigma very short.

Genitalia: Male genitalia quite large. Proctiger slightly longer than forceps, tapering from rather broad base, apex bent posteriorly at right angles. Forceps fairly broad in lateral view, curved forward and then posteriorly near apices, apices black. Female genital segment shorter than rest of abdomen, dorsal valve straight on dorsal side; ventral valve evenly curved up to apex, slightly exceeded by dorsal valve.

Holotype, male, *allotype*, female, and one male paratype, Santa Rita Mts., ARIZONA, July 17, 1932, R. H. Beamer; two male and four female paratypes, Patagonia, Ariz., June 24, 1933, P. W. Oman.

Holotype, allotype and paratype in Snow Entomological Collection, University of Kansas; paratypes in U. S. National Museum and author's collection.

Trioza shepherdiae n. sp.

(Plate V, Fig. 2.)

This typically triozine species does not resemble very closely any of the known North American members of this genus. Length to tip of folded wings, 2.50 mm.

Color: General color of head, thoracic dorsum and legs light testaceous to fulvous. Vertex light except discal foveae; genal cones, eyes, distal half of antennae dark. Prescutum with a pair of brown stripes halfway back. Scutum with two inverted V-shaped, brown marks. Wing membranes slightly fumate; veins brown. Abdomen brown to black.

Structure: Head and thoracic dorsum coarsely granular. Head of medium size, narrower than thorax. Vertex decidedly emarginate in front, with very prominent discal foveae, postero-lateral angles, which bear ocelli, raised. Genal cones short, about one-half as long as vertex, conical, almost parallel to plane of vertex. Antennae about one and one-half times as long as width of head. Pronotum depressed. Prescutum strongly arched. Forewings two and one-half times as long as wide, membrane rather thick, slightly rugose, venation typical. Hind wings more rugose than forewings. Legs of medium length, hind tibiae with one spine outside, two inside.

Genitalia: Male genital segment small. Proctiger as long as forceps, almost right-triangular in lateral view, posterior lobe of medium length. Forceps slender, irregularly narrowed to sharp apices, with medium pubescence. Female genital segment short, dorsal valve decidedly longer than ventral, terminating in a heavy, black, up-curved hook, usually exceeded by partially extended ovipositor sheath.

Holotype, female, *allotype,* male, 45 female and 9 male paratypes, Lake City, COLORADO, June 29, 1937, L. D. Tuthill; 26 female and 5 male paratypes were collected by R. H. Beamer at the same time. Holotype, allotype and paratypes in author's collection, paratypes in Snow Entomological Collection, University of Kansas, and U. S. National Museum.

This species was taken on *Shepherdia canadensis* (L.) Nutt. growing in a dense stand beneath aspen.

Trioza chlora n. sp.

(Plate V, Fig. 3.)

In Crawford's key this species runs to *albifrons*. It is, however, quite unlike the latter species. The genal cones are less acute, less divergent and are directed downward; the wings are very slender and acute at apex. Length to tip of folded wings, 3.25-3.50 mm.

Color: General color white to yellow except eyes and apical two-thirds of antennae black. Thoracic dorsum and vertex deeper yellow to orange. Wings hyaline.

Structure: Head medium in size, post-ocular occipital region very large giving the eyes the appearance of projecting forward. Vertex evenly excavated, rather deeply emarginate in front, extending forward over front ocellus. Genal cones vertical, about as long as vertex, rather acute. Antennae twice as long as width of head. Thorax strongly arched. Forewings almost three times as long as broad, sharply angled. Venation typical triozine.

Genitalia: Male genitalia small. Proctiger broad at base, tapered to slightly produced apex, bearing a black spine at base on either side. Forceps slightly shorter than proctiger, broad in lateral view, anterior margin almost straight, posterior margin slightly curved, apex roundly truncate and slightly produced anteriorly; apical margin brown. Female genital segment shorter than rest of abdomen, basal portion subglobular, apex a short, brown styliform elongation; dorsal valve slightly longer than ventral.

Holotype, male, Pearce, ARIZONA, Aug. 23, 1935, R. H. Beamer; *allotype,* female, Huachuca Mts., Ariz., Aug. 22, 1935, R. H. Beamer. Types in Snow Entomological Collection, University of Kansas.

RHINOPSYLLA SCHWARZI Riley

This species which has been known heretofore only from two males is represented in the Snow Collection by two females. They are similar to the males except that the fore femora are not enlarged, this apparently being a secondary sexual character.

The female genital segment is short, the dorsal valve narrowly hood-shaped, overhanging the ventral valve, the latter scarcely produced, slit at apex.

Allotype, female, Ponce de Leon, FLORIDA, July 13, 1934, R. H. Beamer, and *parallotype,* same data, in the Snow Entomological Collection, University of Kansas.

LEVIDEA n. gen.

Head small, much narrower than thorax, deflexed; vertex smooth, perpendicular, slightly rounded, median suture lacking or at least not apparent except just above front ocellus; genae somewhat swollen below antennae, almost touching; clypeus large and globose, visible from front; antennae moderate in length, longer than width of head. Thorax moderately arched; episternum of pronotum produced laterally around posterior of eye. Wings triozine in venation and shape, pointed at apex, somewhat thickened and maculate. Legs rather short, apex of hind tibia with two spines inside, one outside.

Genotype, Levidea lincata, n. sp.

Levidea lineata n. sp.

(Plate V, Figs. 4, 4a, 4b, 4c, 4d.)

Length to tip of folded wings, 3.00-3.50 mm.

Color: General body color, including legs, stramineous. Vertex and genae light, antennae darker. Eyes dark. Two brown lines extending across prescutum, sometimes incomplete, continuing on scutum as a diverging pair of lines. Membrane of forewings with small brown spots, very thick at anal margin to sparse on costal margin, the veins unspotted except at marginal cells, thus giving general appearance of stripes.

Structure: Head very small, strongly deflexed; vertex slightly swollen in appearance, perfectly smooth except for two very small foveae near the occipital margin and remnant of medial suture above front ocellus. Genae slightly swollen. Clypeus very large, visible from front or side. Antennae twice as long as width of head. Thorax moderately arched, the episternum of the pronotum developed out and around the occiput. Forewings slightly more than twice as long as wide, without pterostigma or cubital petiole, marginal cells about equal.

Genitalia: Male genitalia large, proctiger triangular in outline, broad at base, slightly longer than forceps which are simple, tapering from base to acute apices, quite strongly arched, apices touching, pubescent on posterior margins. Female genital segment large with rather dense, silky pubescence; dorsal valve very large, hood-shaped, ventral valve smaller, sharply pointed.

Holotype, female, *allotype*, male, 9 female and 4 male paratypes, Mustang Mt., ARIZONA, June 12 and 20, 1933, P. W. Oman; 3 female and 1 male paratypes, Mustang Mt., Ariz., June 12, 1933, R. H. Beamer. Holotype, allotype and paratypes in U. S. National Museum. Paratypes in Snow Entomological Collection, University of Kansas and in author's collection.

Mr. Oman says that this unique species apparently lives upon "wild rubber," *Parthenium incanum*.

EXPLANATION OF PLATE V.

Fig. 1. *Psylla nana*, forewing.
Fig. 2. *Trioza shepherdiae*, ♀ genitalia.
Fig. 3. *Trioza chlora*, ♀ genitalia.
Fig. 4. *Levidea lineata*, front view of head.
Fig. 4a. *Levidea lineata*, lateral view of head.
Fig. 4b. *Levidea lineata*, forewing.
Fig. 4c. *Levidea lineata*, ♀ genitalia.
Fig. 4d. *Levidea lineata*, ♂ genitalia.

A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera*.

By WM. P. HAYES, University of Illinois.

Nowhere in entomological literature are bibliographies available to assist in locating works containing keys or tables for the identification of immature insects. The work of Banks listing the keys for adult insects has been of great value to persons looking for keys to adults and it should be brought up to date. We have no such work treating the immature stages. A few institutions throughout the United States are now offering some work in the taxonomy of immature insects. Having been engaged in teaching such a course for twelve years, the writer has accumulated a rather comprehensive bibliography of papers which contain such keys. Mimeographed copies listing the available works in the various orders have been of much use to students and requests for copies from workers throughout the country are frequently received. It is hoped to supplement this work in the near future with bibli-

* Contribution No. 195 from the entomological laboratories of the University of Illinois.

ographies of the other important orders.

"It looks like a muscid larva but we will have to rear it to the adult stage to be sure." This, or some such phrase, is on the lips of almost everyone engaged in the determination of insects for the public. Taxonomic works of the sort here listed are attempts to alleviate this lack of information. It is granted that the field of taxonomy of immature insects is in an immature stage, nevertheless in a number of the orders keys are available to help us recognize at least the more common species.

Among the Diptera, the aquatic forms are perhaps the best known in their developmental stages as is evidenced by the numerous keys to such groups as the Culicidae and Chironomidae and the recent (1934, 1935 and 1937) works of Johannsen. The important work of Malloch (1917) is the most comprehensive work treating of the Orthorrhapha. The Cyclorrhapha have been keyed, mostly, only in connection with those species causing myiasis or affecting the health of man.

The following list is offered as an aid to those who wish to identify larvae and pupae of Diptera. It is not complete and the writer would welcome additional citations.

General Keys.

Alexander, C. P. 1930. Observations on the dipterous family Tanyderidae, *Proc. Linn. Soc. N. S. Wales,* 55: 221-230. (Larval key to families of Orthorrhapha, pp. 225-228.)

Balachowsy, A. and L. Mesnil. 1935. [Key to brachycerous larvae attacking grains and cereals.] In: Les insectes nuisibles aux plantes cultiveés etc. Busson, Paris, Vol. I, 1137 pp. (Key to genera and species, pp. 913-923.)

Banks, N. 1912. The structure of certain dipterous larvae with particular reference to those in human foods. *U. S. D. A. Bur. Ent., Tech. Bull.* 22, pp. 1-44. (Key to some families and genera, p. 15.)

Beling, Th. 1882. Beitrag zur metamorphoses zwei-flügeliger Insecten aus den Familien Tabanidae, Leptidae, Asilidae, Empidae, Dolichopodidae und Syrphidae. *Arch. Naturg.,* 44: 187-240. (Larval key to genera of these families pp. 236-240.)

Brauer, F. 1883. Die zweiflügler des kaiserlichen Museums zu Wien III. Systematische Studien auf Grundlage der Dipternlarven, etc. *K. Akad. Wiss.* (Vienna), *Math.-Naturw.*

Vol. 47, pp. 1-100. (Larval key to families of Orthorrhapha, pp. 17-19; key to genera of Oestridae pp. 36-38; good bibliography of earlier references to larvae.)

BRUES, C. T. and A. L. MELANDER. 1932. Classification of Insects. *Bull. Mus. Comp. Anat.* Harvard. Vol. 73, 672 pp. (Larval key to principal families, pp. 352-368; pupae of principal families, pp. 370-376.)

BUTOVITSCH, V. von, and W. LEHNER. 1933. Bestimmungstabelle der wichtigsten in märkischen Kiefernwaldboden vorkommenden Insektenlarven. J. Springer Co., Berlin, 16 pp. (Keys to families of larvae inhabiting pine forest soil, p. 5.)

FELT, E. P. 1917. [Key to American insect galls.] *N. Y. State Mus., Bull.* 200.

FROST, S. W. 1924. A study of the leaf-mining Diptera of North America. *Cornell Agr. Exp. Sta., Memoir* 78, pp. 1-228. (Key to the more common leaf-mining Diptera based on the type of mine, pp. 19-20; larval key to families, p. 29; larval key to Agromyzidae, pp. 37-38.)

GREENE, C. T. 1918. [Table of common fly larvae.] In: Mimeographed Proceedings of the Class to Study Entomology of Disease, Hygiene and Sanitation. Lecture 15. Sept. 9, 1918, p. 217. Washington, D. C.

ID. 1921. Table to separate larvae (maggots). In: Sanitary Entomology by W. D. Pierce. Badger Pub. Co., Boston, 518 pp. (Larval key to house fly and related species, pp. 142-144.)

GRÜNBERG, K. 1910. Diptera, Zweiflüger. In: *Brauer, Süsswasserfauna Deutschlands,* Heft 2 A, 312 pp. Fisher, Jena. (Larval key to aquatic families, pp. 13-15; Culicidae, p. 80; Stratiomyidae, p. 113.)

HALIDAY, A. H. 1857. List of Genera of British Diptera, the earlier stages of which are more or less perfectly known, etc. *Nat. Hist. Rev.,* IV, p. 177. (A list with family characters of larvae.)

HART, C. A. 1895. Entomology of the Illinois River, Diptera. In *Bull. Ill. State Lab. Nat. Hist.* Vol. 4 (art 6) pp. 184-270. (Key to families of larvae and pupae of aquatic Diptera, pp. 186-189.)

HEGNER, R., R. M. ROOT and D. L. AUGUSTINE. 1929. Animal Parasitology, Century Biological Series, Century Co., N. Y., 731 pp. (Larval key to genera of some common muscoid flies, pp. 584-585.)

HENDEL, F. 1928. Zweiflügler oder Diptera II. Allgemeiner Teil. In: *Die Tierwelt Deutschlands,* Part II, pp. 1-135, Fischer, Jena. (Larval key to families, pp. 113-131; key to

principal forms of pupae, pp. 111-112.)

HERING, M. 1935-1937. Die Blatt-Minen Mittel-und Nord-Europas. Bestimmungs-Tabellen aller von Insekten-larven der verschiedenen Ordnungen erzeugten Minen, Lief. I-VI, pp. 1-112. Gustav Feller, Neubrandenberg; (Lieferung VI not yet published). (Arranged alphabetically by food plants.)

ISAACS, I. M. 1923. Key to the identification of the dipterous families and certain subgroups . . . relating to myiasis. In: Herms, Medical and Veterinary Entomology, Macmillan Co., N. Y. (Larval key p. 315 includes some Trypetidae, Oestridae, Anthomyiidae, Muscidae, Sarcophagidae, and Drosophilidae.)

JOHANNSEN, O. A. 1903. Aquatic nematocerous Diptera. Aquatic Insects in New York State. *New York State Mus., Bull.* 68, pp. 328-441. (Key to families of larvae and pupae and some keys to species, pp. 329-332.)

ID. 1934. Aquatic Diptera, Part I. Nemocera, exclusive of Chironomidae and Ceratopogonidae. *Cornell Univ. Agr. Exp. Sta., Mem.* 164, pp. 1-71, 24 pl. (Many keys to this group.)

ID. 1935. Aquatic Diptera, Part II. Orthorrhapha, Brachycera and Cyclorrhapha. *Cornell Univ. Agr. Exp. Sta., Mem.* 177, pp. 1-62. (Many keys to this group. For Part III see Chironomidae.)

KARNY, H. H. 1934. Biologie der Wasserinsekten. Fritz Wagner, Wien, 311 pp. (Key to families, pp. 187-190.)

LAMPERT, K. 1910. Das Leben der Binnengewässer. Leipzig, 1910. 856 pp. (Larval key to genera of Aquatic Diptera, p. 166.)

MALLOCH, J. R. 1915. Some additional records of Chironomidae for Illinois and notes on other Illinois Diptera. *Bull. Ill. State Lab. Nat. Hist.*, Vol. II, pp. 304-363. (Key to some Ill. pupae of Bombyliidae, Mydaidae, Asilidae and Therevidae, pp. 325-327.)

ID. 1927. A preliminary classification of Diptera, exclusive of puparia, based upon larval and pupal characters, with key to imagos in certain families. Part I. *Bull. Ill. State Lab. Nat. Hist.*, 12: 161-407. (Many keys to larvae and pupae. Best American work.)

NEEDHAM, J. G. 1918. Key to North American aquatic dipterous larvae. In: Ward and Whipple, Fresh Water Biology, John Wiley and Sons, N. Y., 1111 pp. (Prepared by O. A. Johannsen.) (Key to families and genera, pp. 943-946.)

NEEDHAM, J. G., S. W. FROST and B. H. TOTHILL. 1928. Leaf mining insects. Williams and Wilkins Co., Baltimore, Md., 295 pp. (Key to dipterous mines, p. 239; key to *Agro-*

myza, p. 249; *Phytomyza*, p. 261.)

PATTON, W. W. 1922. Notes on the myiasis-producing Diptera of man and animals. *Bull. Ent. Res.*, 12:239-261. (Key to larvae, p. 258.)

RILEY, W. A. and O. A. JOHANNSEN. 1932. Medical entomology. 476 pp. McGraw, Hill and Co., N. Y. (Larval key to families and some genera of aquatic diptera, pp. 194-195; larval key to bots, Oestridae, pp. 309-310; key to three instars of myiasis producing larvae, in part after S. M. Tao. p. 309-376.)

SEGUY, E. 1926. Diptera (Brachyceres). In: *Fauna de France*. Vol. 13, pp. 1-308. (Larval key to families, p. 14, a translation into French of Brauer's key.)

SHARP, D. 1909. [Key to families of Brachycera and also Platypezidae, Pipunculidae and Syrphidae.] In: *Verral, British Flies*, Vol. 5. Gurney and Jackson, London. (This is a translation of Brauer's key. Key to families only.)

TAO, S. M. 1927. A comparative study of the early larval stages of some common flies. *Amer. Jour. Hyg.*, 7:735-761. (Keys to first and second instars. This key is reproduced and a third instar key appended in Riley and Johannsen, 1932.)

KEYS TO SPECIAL GROUPS.

TIPULOIDEA.

ALEXANDER, C. P., and J. T. LLOYD. 1914. The biology of the North American crane-flies. (Tipulidae, Diptera I. The genus *Eriocera* Macquart.) *Journ. Ent. and Zool.* (Pomona) 6:12-23. (Key to larvae, p. 19; key to pupae, p. 20.)

ALEXANDER, C. P. 1914. Biology of the North American crane-flies. (Tipulidae, Diptera.) II. *Liogma nodicornis*, Osten Sacken. *Jour. Ent. and Zool.* (Pomona) 6:105-118. (Key to larvae of Cylindrotomini, pp. 109-110, and key to larvae and pupae of the genus *Liogma*, pp. 110-111.)

ID. 1915. The biology of the North American crane-flies. (Tipulidae, Diptera.) IV. *Journ. Ent. and Zool.* (Pomona) 7:141-158. (Key to larvae and pupae of the tribe Hexatomini, p. 148.)

ID. 1920. The crane-flies of New York, Part II. *Cornell Univ. Agr. Exp. Sta. Memoir* 38, pp. 695-1133. (Key to larvae and pupae of the superfamily Tipuloidea, including Tipulidae, Anisopidae (Rhyphididae), Tanyderidae and Ptychopteridae.)

ID. 1930. Observations on the dipterous family Tanyderidae. *Proc. Linn. Soc. N. S. Wales*, 55:221-230. (Key to pupae of related families, p. 228.)

BELING, T. 1878. Zweiter Beitrag zur Naturgeschichte (Metamorphose) verschiedener Arten aus der Familie der Tipuliden. *Verhand. d. k. k. Zool. Bot. Ges.* Wien, 28: 21-56. (Larval key to species of *Pachyrnia*, p. 44.)

ID. 1886. Dritter Beitrag zur Naturgeschichte (Metamorphose) verschieden Arten aus der Familie der Tipuliden. *Verhand. d. k. k. Zool. Bot. Ges.* Wien, 36: 171-214. (Larval key to various genera, pp. 203-206; species of *Tipula*, pp. 206-213.)

LENZ, F. 1919. Die Metamorphose der Cylindrotomiden. *Archiv. Naturges.* Vol. 85, (Heft 6, Abt. A.), pp. 113-146. (Larval key to genera, pp. 129-130.)

ROGERS, J. S. 1933. Contribution toward a knowledge of the natural history and immature stages of the crane-flies. The genus *Polymera* Weidemann. *Occasional Papers Mus. Zool. Univ. Mich.* No. 268, pp. 1-13. (Larval and pupal key to two species of this genus, p. 11.)

See also the keys of Malloch, 1917; Grünberg, 1910; Hart, 1895; and Johannsen, 1934; cited under general keys.

BLEPHEROCERIDAE.

BEZZI, M. 1912. Blefaroceridi Italianii con descrizione di una nova forma e di due specie esotiche. *Bol. Soc. Ent. Ital.*, 44: 3-114. (Larval key, p. 76.)

MANNHEIMS, B. J. 1935. Beiträge zur Biologie und Morphologie der Blepharoceriden (Dipt.) *Zool. Forschungen*, Band 2. Universitätsverlag von Robt. Noske, Leipzig, 115 pp., 69 figs. (Keys to larva and pupae occurring in the Alps, p. 80.)

(To be continued)

New Records of Odonata for Southeastern Pennsylvania.

During the past three summers, I have done little collecting of these insects but obtained the following noteworthy additions to the local fauna at Cheyney, Delaware County, Pennsylvania. In 1936 at or very close to Smithson's Pond, *Lestes eurinus* (Say), a male, and *Nehalennia irene* Hagen, both sexes, were met on July 25, and a male of *Somatochlora tenebrosa* (Say) on September 1. On May 30, 1937, I took a male *Cordulegaster diastatops* Selys and on August 1, 1938, a male *Cordulegaster erroneus* Hagen, the last two not at the pond.—PHILIP P. CALVERT.

Some Insects Accepted by the American Chameleon, Anolis carolinensis Voigt.

By H. ELLIOTT McCLURE, Ames, Iowa.

During the past fifteen years eight American chameleons, *Anolis carolinensis* Voigt., have been kept in captivity for varying lengths of time, up to five years, and observed. They were purchased at fairs and circuses and freed in cages large enough to give them sufficient exercise. Green plants in the cages helped make the conditions more natural.

The animals will capture a wide variety of insects. They never attack a dead insect, but must capture it alive. Large field crickets, *Gryllus pennsylvanicus* Burm., greater in girth than the chameleon, can be eaten and the prey is gulped into the throat, where it remains distending the neck until it is predigested and passes into the stomach. In capturing its prey, the chameleon tenses its body, points its nose toward the insect, and gathers its hindlegs for the jump. As the insect walks closer, the lizard opens its mouth, sticks the tip of its tongue out, and bobs its head up and down as if aiming carefully. If the insect draws near and stops, the lizard will not strike, but remains motionless until the insect moves again. Then the strike is made. When very hungry it will jump eight or ten inches upon the insect, and very seldom misses.

Moths, flies, and other large insects are generally eaten head first and the wings scraped off by rubbing the head on some object, as a bird cleans its bill on a limb. Foreign objects gotten into the mouth can not be spit out, but are either scraped away or swallowed. Grass and sticks are sometimes swallowed because of this. Occasionally foreign matter is scraped from the side of the mouth by a hind foot.

The following groups of insects have been accepted regularly by the lizards:

Diptera; Muscidae, Sarcophagidae, Bombyliidae, Tabanidae, Syrphidae, Asilidae, Stratiomyiidae, Tachinidae and most other families.

Orthoptera; Tettigoniidae, Gryllidae and small Locustidae.
Neuroptera; Myrmelionidae, Hemerobiidae and Chrysopidae.
Odonata; Small Zygoptera.
Hemiptera; Miridae and very few others.
Hymenoptera; Tenthridinidae and small Ichneumonoidea.
Lepidoptera; butterflies such as, *Grapta interrogationis* (Fabr.), *Vanessa atalanta* (Linne), *Pyrameis cardui* Linne, and others; and moths such as, *Heliothis obsoleta* Fabr., *Carpocapsa pomonella* Linne, *Cirphis unipunctata* (Haworth), *Hemerocampa leucostigma* Smith and Abbott and many others including all available small moths.

The American chameleon discerns fine differences in its prey. For example, one chameleon had remained unfed for a week and was very hungry, so a box elder bug, *Leptocoris trivittatus* Say, was freed in the cage. Quickly the chameleon leaped across the enclosure to seize the victim, but hesitated, eyed the bug by turning its head to one side and, with almost a look of disgust, slowly climbed up a flower-stalk, allowing the bug to walk away. It is doubted that this lizard ever encountered a box elder bug before, but it refused to attempt to eat it. Size was not the deciding factor in the chameleon's decision, for it attacked horse flies or moths one-fourth to one-half its own size with alacrity.

At another time, this same lizard attempted to eat a red-legged grasshopper, *Melanoplus femur-rubrum* De Geer, and after a vicious struggle, during which the grasshopper kicked the lizard violently about the face, it succeeded in killing and eating it. The chameleon could never be induced to attack another grasshopper of any size after that. The lizards delight in crickets, but shun cockroaches. A wasp or bee is left to its own activities while a bee fly or a small ichneumon is snapped up. When a honey bee was released in the cage of a chameleon, it refused to eat the insect, but kept close watch upon its clumsy flight and avoided it. The bee was removed and a drone fly, *Eristalis tenax* Linne, released in the cage. It was immediately taken by the lizard. If numerous flies, such as blue-bottle flies, are released in the cage, the chameleon will

eat its fill, sometimes as many as ten or fifteen, and then, because the remaining flies disturb it by walking over it and getting their feet in its eyes, the lizard will systematically catch and crush each fly, and then scrape it from its mouth. In this way it relieves itself of the torment.

All of these instances show a fairly accurate degree of discernment. As the lizard always hesitates before it strikes, it has time to observe the prey and classify it as to its delectability, therefore mimicry and protective coloration in the insects seem to be of little value in protecting them from its attack.

Three New Geophiloid Chilopods.

By Ralph V. Chamberlin

The types of the new species described below are at present in the author's collection.

Gosiphilus auximus sp. nov.

This yellowish form has the usual conspicuously flattened body. Head broad, with basal plate equally broad and somewhat narrowed caudad. The antennae flattened and attenuate distally, contiguous at base. Prehensors concealed from above; the claws short, rather stout, when closed falling much short of anterior border of head; chitinous lines sharply defined and complete.

Spiracles small, circular. Ventral pores in a transversely elongate area. Last ventral plate wide as usual. Each coxa bearing about eight small, inconspicuous pores, about half of which are covered by the last ventral plate. Anal legs of male conspicuously and clavately thickened. Pairs of legs, 149.

Length, about 65 mm.

Holotype: Male, Edinburg, Texas, Oct. 16, 1936, (S. Mulaik).

This form seems readily distinguishable from *G. laticeps* in having typically 149 as against 81 pairs of legs.

LEPTODAMPIUS gen. nov.

The claw of the prehensors narrow and thin at base where excavated above as in *Agathotus*. It differs from the latter genus, however, in having the claw article of the prehensors with a conspicuous chitinous antero-mesal corner or tooth, as

well as in having the last ventral plate narrow instead of very broad, etc.

Genotype, L. lamprus, sp. nov.

Leptodampius lamprus sp. nov.

Pale yellow throughout. Cephalic plate short, with the frontal suture present. Antennae not distally attenuate. Prebasal plate not exposed. Basal plate slightly widened cephalad. Claws of prehensors when closed nearly attaining anterior margin of head; smooth, slender to abruptly wider but short basal portion which bears a chitinous angle or tooth at its antero-mesal corner. Chitinous lines not present.

Spiracles rather small, circular, the first not enlarged and those of posterior region scarcely reduced. First legs shorter and more slender than the second. And legs but little thicker and longer than the preceding pair. Last ventral plate moderate in breadth, narrowed caudad; corresponding tergite broad. Last coxae bearing about 15 small pores ventrally and laterally. Anal pores present. Pairs of legs, 63.

Length, about 37 mm.

Holotype: female, Boyer, OREGON, (J. A. Macnab).

Brachygeophilus leionyx sp. nov.

Color yellow throughout. Cephalic plate relatively broad, smooth and shining without sulci and with no definite frontal suture. Prebasal plate not exposed. Basal plate short, broad and trapeziform. Claws of prehensors when closed not attaining front margin of head, smooth, neither these nor other articles bearing denticles. Chitinous lines present, fine, incomplete anteriorly.

Spiracles circular, the first not larger than those immediately following, the others gradually decreasing caudad. Last ventral plate broad, trapeziform, the sides converging caudad, the caudal margin straight. Each of the last coxae bearing about 18 small pores, of which one is somewhat larger and stands by itself in a more caudal position; the others along and under border of ventral plate, and especially along dorsal plate and at anterior end. First legs decidedly shorter and more slender than the second pair. Anal legs in female much exceeding the penult in thickness and length, the claw long and smooth. Pairs of legs, 63.

Length, about 26 mm.

Holotype: female, and 1 *paratype* female, Boyer, OREGON, (J. A. Macnab.)

The Concentration of Heliothis obsoleta Moths at Food. (Lepidoptera: Noctuidae).

By G. W. Barber, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

Certain unusual and destructive infestations of the corn-ear worm, *Heliothis obsoleta* (F.), seem to result from concentrations of moths for feeding. Moths are attracted to plants in blossom; and if corn is not available at the time, the moths deposit eggs on these same plants. When not in blossom, the moths are attracted to these plants little if at all.

The first observed site of such a concentration was a 100-acre soybean field of the variety O-Too-Tan in Washington County, Georgia. During the third week of September, 1933, the plants of this field were in blossom, and on September 19 a tremendous population of *Heliothis obsoleta* was observed. Many times as many moths were present than had ever been noted by the author in a like area before; as one walked through the bean field moths arose in tremendous numbers. Later, these moths laid many eggs on the plants, certainly enough to result in the destruction of the crop had the eggs all hatched and had even a part of the larvae survived. At this time, in the vicinity of this field, very few *H. obsoleta* moths were found elsewhere, and practically no moths were to be found in fields of soybeans which were older and which bore less profuse bloom, although such plants were suitable as larval food.

It seemed probable that moths had migrated to this field to feed on the blossoms. Not only were the blossoms of other plants relatively scarce because of dry, warm weather, but the millions of blossoms in this field seemed to have had an attraction somewhat in proportion to the mass of bloom present.

These moths remained over a period of at least 2 weeks in the bean field, hiding among the plants during the hours of daylight. Possibly because corn was then unavailable, all having ripened, they laid eggs on the plants on which they had fed and among which they rested.

The second observed instance of concentration of these

moths for feeding was in Estill, South Carolina, where, in the first week of June, 1934, moths were very abundant in a late-planted flax field of about 25 acres, which was at the height of blossoming. Moths had apparently concentrated in this field from some distance because of the abundant food supply. Many eggs were laid on the flax plants, and the resulting larvae did considerable damage.

In this instance, corn ranging from a foot to 18 inches in height occurred in the vicinity, and would normally have attracted moths for oviposition. After remaining in the flax field for a week or 10 days, hiding among the plants during hours of daylight, the moths disappeared between June 14th and 18th; they were very abundant on the former date, while few remained on the latter date. Possibly they had migrated to corn fields in the vicinity.

During the first week in June, when moths became very abundant in the flax field described, they were absent or very scarce in earlier-planted flax fields which at that time bore fewer blossoms, although plenty of green bolls suitable as larval food were present. A generation of *H. obsoleta* had occurred in the flax fields during May, and the larvae had attacked, in particular, an earlier-planted field of 50 acres which adjoined the late-planted field. During the first week in June, adults emerged from the May brood of larvae in the larger field, but all those emerging in this earlier-planted field migrated to the late-planted field where blossoms were much more abundant. Moths emerging in other early-planted flax fields in the vicinity also migrated to the blossoming field. Few eggs were laid in any of the early-planted fields during the first week of June, and few moths hid in these early-planted fields. Available larval food, green bolls, seemed to have had little influence on oviposition. It seemed probable that the moths were attracted to the late-planted flax fields for food, and that they laid eggs somewhat incidentally. The mass of blossoms in a field at the height of blooming attracted many moths, while fewer blossoms in older fields attracted few.

These observations and many others seem to show (1) that

moths congregate in fields with an abundance of blossoms for feeding; (2) that it is possible that this food attracts moths in numbers and from distances somewhat proportionate to the mass of bloom; (3) that the moths may lay eggs on such plants, notwithstanding the fact that these may not be preferred or usual food plants; (4) that unusually severe injury to such plants by larvae may be traced to their attractiveness as feeding locations for the moths; (5) that large concentrations of moths have been observed only at times when corn was not available in attractive stages of growth, namely, early in the spring and during the fall.

A Note on Synonymy in Spiders (Araneae: Salticidae and Argiopidae).

B. J. KASTON, New Haven, Connecticut

In 1932, Banks proposed a new name, *Allepeira,* for the genus known as *Hentzia* McCook 1894. He called attention to the fact that the name *Hentzia* had already been used by Marx for a spider belonging to the genus *Wala.* The publication containing Marx's generic name is a little known pamphlet by L. O. Howard, *"A list of the invertebrate fauna of South Carolina,"* being Chapter XI of *"Resources of South Carolina,"* published at Charleston, July 19, 1883. On page 1 appears the following statement: "With regard to the order Araneina (spiders) I have been enabled, through the kindness of Mr. George Marx, of Washington, to present not only a list of the described species, but to add to it a large number of undescribed species, indicated by Mr. Marx's manuscript names."

This list of spiders' names (pages 21 to 26 inclusive) contains, in addition to the many manuscript names, which being *nomina nuda* have no standing, three generic names associated with previously described species. One of these is *Hentzia,* to which Banks has already called attention (Marx listed *Hentzia palmarum* (Hentz) on p. 26). Since Keyserling's *Wala* was not established until 1884 and has for its type his *albovittata,*

which is the same as Hentz's *Epiblemum palmarum, Wala* becomes a synonym of *Hentzia* Marx. On page 22 appears *Ocrepeira ectypa* (Walck.); but Walckenaer's *Epeira ectypa* belongs in the genus *Wixia* O. P.-Cambridge 1882, of which accordingly *Ocrepeira* becomes a synonym. The third generic name with which we are concerned also appears on p. 22, and in association with two species: *Acanthepeira stellata* (Hentz) and *verrucosa* (Hentz). In 1888, *Epeira verrucosa* Hentz was shown by McCook to be the same as *E. arenata* Walck., and was made the type of a new genus, *Verrucosa*, (in the same manner as did Marx, by simply associating the new name with the already described species). The species *E. stellata* Hentz being the same as the one for which McCook in 1894 established the genus *Marxia*, it follows that the latter name becomes a synonym of *Acanthepeira* Marx.

Some question may arise as to whether Howard rather than Marx should be cited as authority. However, I think it is clear from an interpretation of Article 21 of the International Rules of Nomenclature [1] that the names should be credited to Marx. It is indeed unfortunate that Marx did not continue to use the names he had proposed. Since they were omitted from his catalogue of American spiders, and from the subsequent catalogues of Banks and of Petrunkevitch, their synonyms, instead, have come to be well known.

Notes on the Eggpods of Appalachia hebardi and Dendrotettix quercus (Orthoptera: Acrididae; Cyrtacanthacridinae).

By JOHN W. H. REHN, Philadelphia, Pennsylvania.

While engaged in some local field work this summer it has been possible to obtain live material of both *Appalachia hebardi* and *Dendrotettix quercus*, the Post-Oak Locust. As there is no published information on the biology of either of these in-

[1] "The author of a scientific name is that person who first publishes the name in connection with an indication, a definition, or a description, *unless it is clear from the contents of the publication that some other person is responsible* for said name and its indication, definition or description." (Italics mine.)

teresting grasshoppers we have attempted to secure some data along these lines.

At the present time I have been able to obtain eggpods of both of these rather rare or, at least, exceedingly local grasshoppers and we believe that a brief description of these eggpods would be of some interest.

The pods of *Dendrotettix quercus* vary, in transverse section, from subquadrate to more or less rectangulate, the eggs being placed in an almost vertical position. The greatest length of the four pods examined varies from 4 to 6 mm. while the width remains relatively constant at about 4 mm. The number of eggs contained in these varies from six to eleven or twelve, all more or less vertical although usually inclined to some degree. The eggs of a pod may all be inclined in the same direction or they may be tilted in various directions, there appearing to be no regular pattern. The eggs, which are buckthorn brown, are about 5 mm. long and in lateral view are more or less elliptical. The eggs are surrounded and covered by a chestnut brown mucous matter which holds the mass together. In some of the pods before me this mucous material appears relatively transparent, while in others it is decidedly opaque.

While only one pod of *Appalachia hebardi* has been obtained its appearance is so unusual that it is noteworthy, yet at the same time it is my firm belief that the eggpod is perfectly normal. The whole mass is a subcircular disk with a diameter of about 9 mm. and a height of 3.5-4 mm. The eggs are directed obliquely and diagonally upward through the mass which contains approximately ten eggs. These eggs are more or less fusiform and are buckthorn brown. The mucous mass that surrounds the eggs is light sudan brown and quite frothy, having a very strong resemblance to the material found in a mantid öotheca.

It is my hope that I may be able to continue the work started on these forms and that some knowledge of their life history may be obtained.

A Breeding Record for the Red-barred Sulphur (Callidryas philea Linn.) from Indiana (Lepid.: Pieridae).

During the last week of August, 1936, I was fly-fishing on Little Blue River in Union Township, Shelby County, Indiana, across the highway from Pitt's Playground. On a branch of the legume, wild senna, *Caffia marilandica,* which was bending over the water, I saw a golden-colored larva about fifty millimeters in length. The golden color was most conspicuous but there were some fine black lines running dorso-ventrally on the lateral surface of several segments. I carried the larva home on the branch for further observation. In the next few days it ate some small holes in the leaves and then formed a chrysalis. A short time later the adult emerged and was identified as *Callidryas philea.*

Seitz (1924) used the name of *Catopsilia philea* for this lepidopteron and states that it has been observed as a migrant in Illinois and that it is abundant from Texas to southern Brazil.

Holland (1931) points out that little is yet known of the early stages of this insect. He mentions that it occurs in Texas and has been found in Illinois as a straggler. It is abundant in Mexico, Central America, and southward.

Mrs. Kite (1934) says that this butterfly appeared at the Lake Taneycomo Region in the Missouri Ozarks on September 20, 1928 and also in October 1929.

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ROBERT H. COOPER, Ball State Teachers College, Muncie, Indiana.

Flashing of Fireflies

Flashing is the result of a rise and fall in the osmotic pressure of the photogenic cells. This phenomenon is under spontaneous cerebral control in the normal animal but can be imitated by injection of hypertonic solutions or by partial asphyxiation, thus producing a continuous glow.

MALOEUF in Annals, Entom. Soc. America, Sept., 1938.

Biological Abstracts.

In the NEWS for June, 1935, page 168, we made a plea for support adequate to insure the continuance of *Biological Abstracts* and we pointed out why the *Abstracts* are of such transcending importance to the investigator and the teacher in Biology. The struggle to secure that support has continued. It has seemed to those now in charge of the *Abstracts* that not only should subscriptions to each complete yearly volume continue to be sought, but also that provision be made for supplying to those who desire them parts of each volume at, of course, reduced rates. For the year 1939 five such parts are projected:

I. General Biology to include General Biology, Biography-History, Bibliography, Evolution, Cytology, Genetics, Biometry and Ecology; price $4.00.

II. Experimental Animal Biology to include Animal Physiology, Nutrition, Pharmacology, Pathology, Anatomy, Embryology and Animal Production; price $9.00.

III. Microbiology and Parasitology to include Immunology, Bacteriology, Viruses, Parasitology, Protozoology and Helminthology; price $5.00.

IV. Plant Sciences to include Phytopathology, Plant Physiology, Plant Anatomy, Palaeobotany, Systematic Botany, Agronomy, Horticulture, Forestry, Pharmacognosy and Pharmaceutical Botany; price $6.00.

V. Animal Sciences to include Palaeozoology, Parasitology, Protozoology, Helminthology, Systematic Zoology and Economic Entomology; price $6.00.

The sum of the prices of the five parts is $30.00, but subscribers to the complete volume will receive it for $25.00.

The great advantages of *Biological Extracts* are still with the complete volume. The entomological part-subscriber will doubtless take Part V; so doing he will lose, at least, abstracts of many valuable articles on insect physiology and embryology included in Part II, on insect evolution, genetics and ecology for which he must look in Part I. A different grouping into parts may be devised for his needs. How far additional groupings may be desirable we do not pretend to know, but convinced as we now are and as we were in 1935 of the absolute necessity and prime importance of abstracts, the only satisfactory solution appears to us to be the complete volume. The expense to the individual may seem high, but it should have the first claim on his professional budget.

PHILIP P. CALVERT.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Barnes, H. F.**—Recent advances in Entomology. [Sci. Progr.] 33:117-123. **Fullaway, D. T.**—Orchid insects. [37] 10:43-49. **Gould & Deay.**—Notes on bionomics of roaches inhabiting homes. [Proc. Indiana Acad. Sci.] 47:281-284. **Huang, S. M. Yekfa.**—An abridged taxonomic catalogue of insects infesting stored grains and grain products. [Science, Sci. Soc., China] 22:165-179. **Huxley, J.**—Clines: an auxiliary taxonomic principle. [31] 143:219-220. **Isely, F. B.**—Survival value of Acridian protective coloration. [84] 19:370-389, ill. **Knowlton, G. F.**—Lizards in insect control. [43] 38:235-236. **Malaise, R.**—On the designation of generotypes by Fabricius. A response to McAtee. [28] 1938:99-106. **Tarshis, M. S.**—Surgical maggots in modern medicine. [76] 1938:252-257. **Weiss, H. B.**—Thomas Martyn's "English Entomologist." [6] 46:321-325. Paper from wasp's nests. [6] 46:244.

ANATOMY, PHYSIOLOGY, ETC.—**Babers, F. H.**—A septicemia of the southern army worm caused by Bacillus cereus. [7] 31:371-3. **Bergmann, W.**—The composition of ether extractives from the exuviae of the silkworm, Bombyx mori. [7] 31:315-321. **Bradley & Arbuthnot.**—The relation of the host physiology to development of the Braconid parasite, Chelonus annulipes. [7] 31:359-365, ill. **Bushnell, R. J.**—The relation of nutritional levels to the growth of populations of Tribolium confusum. I.—Growth of larval, pupal

and adult populations in cornmeal and cornmeal supplemented with yeast. [7] 31:345-351, ill. **Emden, F. van.**—See under Coleoptera. **Evans, J. W.**—The morphology of the head of Homoptera. [Pap. & Proc. R. Soc. Tasmania] 1937:1-20, ill. **Flanders, S. E.**—Cocoon formation in endoparasitic Chalcidoids. [7] 31:167-180, ill. **Forbes, J.**—Anatomy and histology of the worker of Camponotus herculaneus pennsylvanicus (Hym., Formicid.). [7] 31:181-195, ill. **Frolova, S. L.**—Development of the giant salivary gland nuclei of Drosophila. [31] 141:1014-1015, ill. **Gates, F. R.**—The structure of the chromosome. [J. R. Micro. Soc.] 58:97-111. **Glancy & Howland.**—Transplantation of mutant and wild type bristle-bearing tissues in Drosophila melanogaster. [92] 75:99-105, ill. **Goldschmidt, R.**—A note concerning the adaptation of geographic races of Lymantria dispar to the seasonal cycle in Japan. [90] 72:385-386. **Haskins & Enzmann.**—See under Hymenoptera. **Haug, G. W.**—Mass egg production by the Coccinellid Hippodamia convergens. [7] 31:366-369, ill. **Kowalczyk, A. A.**—A report on the intestinal protozoa of the larvae of the Japanese beetle. [Trans. Amer. Micr. Soc.] 57:229-244, ill. **Maloeuf, N. S. R.**—The basis of the rhythmic flashing of the firefly. [7] 31:374-380, ill. **Mattingly, H. E.**—The morphology of the alimentary tract of the blister beetle, Epicauta pennsylvanica (Coleo.: Meloid). [43] 38:250-263, ill. **Pelton, J. F.**—The alimentary canal of the Aphid Prociphilus tessalata. [43] 38:164-169, ill. **Quayle, H. J.**—The development of resistance to hydrocyanic gas in certain scale insects. [Hilgardia] 11:183-210, ill. **Slack, H. D.**—Chromosome numbers in Cimex. [31] 142:358. **Stiles, K. A.**—Intermediate-winged Aphids and the time-of-determination theory. [92] 74:430-460, ill. **Trager & Subbarow.**—The chemical nature of growth factors by mosquito larvae. [92] 75:75-84. **Vachon, M.**—Recherches anatomiques et biologiques sur la reproduction et la developpement des Pseudoscorpions. [3] (9 1:1-207, ill. **Williams, I. W.**—The comparative morphology of the mouthparts of the order Coleoptera treated from the standpoint of phylogeny. [6] 46:245-289, ill. **Woodworth, C. E.**—The reaction of wireworms to arsenicals. [47] 57:229-238.

ARACHNIDA AND MYRIOPODA.—**Ewing, H. E.**—A key to the gen. of chiggers (mite larvae of the subfamily Trombiculinae) with descriptions of n. gen. & spp. [91] 28:288-295. **Herman, C. M.**—Occurrence of larval and

nymphal stages of the rabbit tick, Haemaphysalis leporis-palustris, on wild birds from Cape Cod. [19] 33: 133-134. **Hilton, W. A.**—A new Symphylan from near Death Valley.]13[30: 68-69, ill. **Jacot, A. P.**—More primitive moss-mites from North Carolina, III. [J. Elisha Mitchell Sci. Soc.] 54: 127-137, ill. (*). **Larson & Green.**—See under Hymenoptera. **de Mello-Leitao, C.**—Algunas Aranas nuevas. [Rev. Mus. Lat Plata) 1, Zool.: 89-118, ill. (S*). **de Mello-Leitao, C.**—Consideracoes sobre os Phalangodoidea com descricao de novas formas. [15] 10: 135-145, ill. **Remy, P.**—Die Eurupauropodidae (Myriapoda: Pauropoda) des Naturhistorischens Museum zu Wien. [Verh. Zool.-Bot. Ges. Wien] 86-87: 1-34, ill. (k.). **Verhoeff, K. W.**—Uber einige Amerikanische Myriapoden. [34] 122: 269-284, ill. (k*). Uber einige Chilopoden des Zoologischen Museum in Munchen. [34] 123: 123-130. (S*).

THE SMALLER ORDERS OF INSECTS.—Banks, N.—Antillean Ascalaphidae. [J. Dept. Agr. Univ. Puerto Rico] 22: 177-180, ill. (k*). **Cowley & Gloyd.**—Redescription of the types of Protoneura tenuis and a study of variation in this species. [114] no. 378, 18 pp., ill. **Hilton, W. A.**—Nervous system & sense organs, LXXV.—Trichoptera. [13] 30: 70. **Kennedy, C. H.**—Palaemnema picicaudata, P. abbreviata, & P. brucelli, new dragonflies from Ecuador, with notes on other Palaemnemas (Odonata: Platystictidae). [7] 31: 249-266. **Klingstedt, H.**—A taxonomical study of the gen. Cyrnus including the description of a n. sp. with some remarks on the principles of taxonomy. [Act. Soc. Faun. & Flor. Fenn.] 60: 573-598, ill. **Lestage, J. A.**—Contribution a l'etude des Ephemeropteres, XVII.—La dispersion holarctique ephemeropterienne. [33] 78: 246-249. **Milne & Milne.**—The Arctopsychidae of continental America north of Mexico (Trichoptera). [19] 33: 97-110, ill., (k). **Ricker, W. E.**—A new stonefly from Baffin Land (Plecoptera: Capniidae). [4] 70: 173-174, ill. **Sakimura, K.**—Thysanoptera of Kauai with notes on the incidence of yellow spot on wild host plants. [37] 10: 167-173, ill. **Schmidt, E.**—Check-list of Odonata of Oceania. [7] 31: 322-344.

ORTHOPTERA.—Hebard, M.—See Tinkham. **Isely, F. B.**—See under General. **Rehn & Hebard.**—N. gen. and spp. of West Indian Acrididae with notes on previously-known spp. [1] 64: 201-226, ill. **Tinkham, E. R.**—Western Orthoptera attracted to lights. [6] 46: 339-353.

HEMIPTERA.—Barber, H. G.—A review of the gen. Crophius with descriptions of three n. spp. (Lygaeid.). [6] 46:313-319, (k). **Davis, W. T.**—New N. A. Cicadas with notes on described spp. [6] 46:291-311, ill. **DeLong, D. M.**—A n. gen. and four n. spp. of Cicadellidae from the U. S. [43] 38:217-218. **Palmer, M. A.**—Additional Aphids from Colorado. [7] 31:352-357, ill. (*). **Plummer, C. C.**—The gen. Atymna & a. new related gen. (Membracid.). [6] 46:235-243, ill., (k*). **Rau, G. J.**—Four more n. spp. of mealybugs from New York State (Kermidae & Pseudococcidae). [4] 70:157-165, ill. **Smith & Knowlton.**—The Aphid gen. Microsiphum in Utah & Idaho. [7] 31:162-166, ill. (k*). **Usinger, R. L.**—Biological notes on the pelagic water striders (Halobates) of the Hawaiian Islands, with description of a n. sp. from Waikiki (Gerridae). [37] 10:77-84, ill. Review of the genus Gastrodes (Lygaeid.). [61] 23:289-301, ill., (k*).

LEPIDOPTERA.—Abbott, C. E.—Courtship in Hesperidae. [19] 33:127. **Balduf, W. V.**—The rise of entomophagy among the Lepidoptera. [90] 72:358-379. **Forbes, W. T. M.**—Acentropus in America (Pyralid.). [6] 46:328. **Hayward, K. J.**—Hesperioidea Argentina, VIII.—Especied y procedencias adicionales para la fauna Argentina. [106] 125:374-383. **Heikertinger, F.**—Die Mimikry des Tagfalter Sudamerikas: Die Dismorphiinen. [Verh. Zool.-Bot. Ges. Wien] 86-87:35-72, ill. **Herz, A.**—Biological notes on Chabuata (Noctuid.). [19] 33:135-136. **Johnson, J. W.**—Calosaturnia albofasciata sp. nov. (Saturniid.). [19] 33:128-130, ill. **McAlpine, W. S.**—Life history of Calephelis muticum (Riodinid.) [19] 33:111-121, ill. **McDunnough, J.**—An apparently new Eupithecia from eastern North America (Geometr.). [4] 70:171-173, ill. **Soraci, F. A.**—Persistence of Tortilia viatrix. [6] 46:320. **Swezey, O. H.**—Identity of the Nutgrass Armyworm in Hawaii. [37] 10:75-76. **Williams, C. B.**—Recent progress in the study of some North American migrant butterflies. [7] 31:211-239, ill. **Wyatt, A. K.**—Further notes on Chabuata notata and description of a new form. [19] 33:131-133.

DIPTERA.—Alexander, C. P.—Records and descriptions of Neotropical crane-flies (Tipulidae), X. [6] 46:327-337, (*). Studies on the crane-flies of Mexico. [7] 31:393-412. **Bryan, E. H.**—Key to the Hawaiian Drosophilidae and descriptions of new species. [37] 10:25-42, ill. **Edwards, F. W.**—

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(Chrysomel.). [107] B, 7:109-116, ill. (S*). **Williams, I. W.**—See under Anatomy. **Zimmerman, E. C.**—Two insect immigrants new to the Hawaiian fauna (Curculionidae and Drosophilidae). [37] 10: 131-132. Note on Typhlonesiotes swaluwenbergi (Carabidae). [37] 10: 132. On Limnastis and Nesomicrops (Carabidae). [37] 10: 133-134. On Chaenosternum with a key to the gen. of Hawaiian Cryptorhynchinae (Curculio.). [37] 10: 134-136. Stenotrupis of Samoa and Hawaii (Curculio.). [37] 10: 136-139, ill. (k*). Heteramphus of Oahu (Curculio.). [37] 10: 139-142, ill. (k*). Atelothrus on Oahu (Carabidae). [37] 10: 142-144, ill. (k). A key to the gen. of Hawaiian Anthribidae. [37] 10: 152. A key to the Lanaian Proterhinus (Aglycyderidae). [37] 10: 153-155. A second sp. of Elytroteinus (Curculio.). [37] 10: 155-157, (*).

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GRUNDRISS DER INSEKTENKUNDE. By HERMANN WEBER, Professor of zoology and comparative anatomy, University of Münster, Germany. Published by Gustav Fischer at Jena. 258 pp., 154 figs. Price: unbound RM 12, bound RM 13.50. This book is an epitome of almost the whole field of entomology, except that which treats of the destruction of insects by man. The author presents it as a text designed to accompany a two-semester lecture course, or as a comprehensive review of scientific entomology for the general reader. The subject matter is divided into three principal parts: first, development, structure, and function of the insect body; second, structural characters of the principal insect groups, and third, ecology. In the first two parts the emphasis is on structure, development, and metamorphosis, but there is also a liberal interspersion of physiology. An outstanding feature of the book is the nature and quality of the illustrations, which are all exceptionally clear, simplified, and well lettered. Many are diagrammatic but with a realistic treatment that makes them easily understood and at the same time convincing.

The first part begins with embryonic development, in which the general facts of insect embryogeny, blastokinesis, and hatching are concisely treated. This is followed by a discussion of the fundamental structure and functions of the body and its organs, subdivided according to the various anatomical systems. Postembryonic development is the topic of the next section, and here is given an excellent analysis of the subject matter of metamorphosis, both external and internal, a classification of the various types of metamorphic changes in different groups of insects, and a discussion of what is known of the physiological factors of metamorphosis. A fourth section treats of the changes following metamorphosis, which the author divides into three phases; first that of the attainment

of structural maturity; second the phase of sexual activity, and third the period of senescence, which ends naturally with death. In this section are discussed such subjects as the ripening of the sex cells, the significance of sexual reproduction, sex determination, sexual dimorphism, sex mating, parthenogenesis, oviparity and viviparity, and the degeneration of tissues in old age.

The second major division of the text gives the characteristic structural features of the superorders of insects, but does not go further into taxonomy except to designate the principal orders under each group. The illustrations in this division are particularly interesting because many of them represent the insects as transparencies, showing not only the external structure but the internal organs as well, which latter thus appear in their relation to the outer parts of the body.

The third part of the book is a classified summary of the factors of insect ecology. First is given the relation between individuals of a species, including the impersonal relation of the parent to the offspring in providing for the protection of the eggs and the welfare of the brood, the direct care of the young after hatching, and the complex relations between adults and young in social organizations. Second, the relation of insects to other animals, including animal symbiosis, predacity, parasitism, animal enemies of insects, and insects as carriers of disease. Third, the relation between insects and plant life, wherein are included plants as enemies of insects (fungus parasites and insectivorous plants), insects as enemies of plants, mutually beneficial relations with flowering plants, and plant symbiosis. Fourth, the protective devices of insects against their enemies. Fifth, the relation of the physical world to the lives of insects. Sixth, population changes as affected by biotic and abiotic factors. Seventh, distribution in space. A concluding section briefly treats of the relation between insects and man.

"Grundriss der Insektenkunde" unquestionably presents a well-arranged outline for a course on the fundamentals of entomological science, and furnishes the student or general reader a thorough digest of the subject material. R. E. SNODGRASS.

ENTOMOLOGICAL NEWS

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Descriptions of some new forms of Pseudolucanus capreolus. (Coleoptera: Lucanidae).

By BERNARD BENESH, North Chicago, Illinois.

PSEUDOLUCANUS CAPREOLUS (L.).

1764. *Scarabaeus capreolus* L., Museum Ludovicae Ulricae, p. 32.

A recent examination of some preserved specimens of our common stag beetle, *Pseudolucanus capreolus* (L.), disclosed two examples which are worthy of record. Taken in company with 120 others having typical mandibular characters, on my annual trips in 1935 and 1936 to Deer Lodge, Morgan County, Tennessee, they were believed, at the moment of discovery, to be a hitherto undescribed form or perhaps a new species. To settle this question to my satisfaction, the specimens were sent to Dr. E. A. Chapin, Curator of Insects, U. S. National Museum, for inspection, who, on returning the two examples, submitted additional material for reference from the National Collection, recommending their description. I am under deep obligation to Dr. Chapin, for the kindly loan of the material in the National Collection, and thank him heartily for the opportunity to figure and describe the possible variations which we may encounter in our stag beetles.

All the examples, that is, the two males in my own cabinet and four males from the National Collection, are of intermediate size, ranging from 19.75 to 23.5 millimeters. In comparison with a magnificent male of 39 mm., the six forms appear to be mere dwarfs. They differ to a great extent in mandibular dentition; the typical male is designated as Form *A*, and there is even an edentate phase, which is, however, not the smallest individual as could be surmised, but compares favorably as to size with the other multidentate forms, which, it appears, are relatively uncommon in occurrence.

As is well known, the constant form of this species is equipped with symmetrical mandibles, esplanate dorsally, armed internally with a single obtuse, slightly subdorsal tooth, the position of which varies from the apical third to the middle of the mandible. In the specimens before me, these subdorsal teeth are not so well developed, being represented by a simple conical denticle, or, in one instance entirely lacking. For convenience, the subdorsal tooth is called *upper*, and the additional teeth noted, *lower;* they vary in size and position, as indicated in the subjoined descriptions.

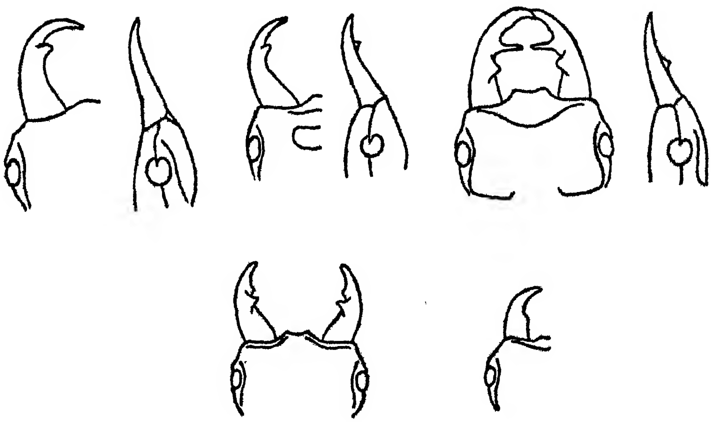


Fig. 1 Fig. 2 Fig. 3
Fig. 4 Fig. 5

Forms of *Pseudolucanus capreolus* (L.). Fig. 1, Form A, typical; 2, *nigricephalus* ab. nov.; 3, Form C; 4, Form D; 5, Form *muticus* (Thunberg.).

FORM A. FIG. 1.

Typical male of the largest development in my possession, purposely selected for illustration, measures 39 mm. with mandibles. Dark chestnut, shining. Mandibles strongly incurved, esplanate dorsally, with a distinct subdorsal (upper) tooth, not visible when viewed from the side (fig. 1).

No(rthern) ILL(INOIS). 22-VI-30. Collected by B. Benesh, near Libertyville, in a deciduous forest with beeches predominating, at dusk. Accession No. 649.

PSEUDOLUCANUS CAPREOLUS **nigricephalus** ab. nov. FIG. 2.

A distinct new form, readily distinguishable by its coloration and nearly erect mandibular subdorsal tooth, readily seen when viewed laterally; 34 mm. long, highly polished, shining. Head and pronotum entirely black, the latter becoming gradually lighter in shade towards the base, where it matches the dark chocolate-brown elytra. Head nearly destitute of the semicircular occipital carinae present in Form *A*, sloping gently from the vertex to front, with a frontal, transverse kidney-shaped depression, between and on line with the eyes. Mandibles not so strongly curved at apex as in the preceding form, more cylindriform, with the subdorsal tooth more elevated, and exposed to view from the side (fig. 2). Venter and legs distinctly concolorous (dark chestnut).

Type: 1 ♂ No (rthern) ILL(INOIS). 10-VI-28. Taken at Beach (now Dunes Park) by the writer and in his collection No. 653. Another example of this distinct aberrant is preserved in the collection of Mr. J. W. Angell, New York, which I have had the privilege to examine during my brief visit to that metropolis in 1932.

FORM C. FIG. 3.

Multidentate, cherry-red, 23.25 mm. long. Mandibles symmetrical, uniformly curved from base to apex, cylindriform, more coarsely punctuate than in the preceding two forms. Subdorsal (upper) tooth indicated by a conical denticle and, anterior to this, a lateral (slightly lower) acute prong pointing at a right angle inwards (fig. 3). Legs reddish-yellow.

Type: 1 ♂, Deer Lodge, TENNESSEE, June 1936. B. Benesh, collector and in his collection No. 4346.

FORM D. FIG. 4.

Multidentate, dark chocolate-brown (possibly discolored in the preserving fluid), 22.5 mm. long. Mandibles symmetrical, with the upper tooth present as a conical tubercle which is bigger than the lower and feebly indicated anterior tooth (fig. 4). Legs obscurely reddish.

Type: 1 ♂, Deer Lodge, TENNESSEE, June 1935. B. Benesh, collector and in his cabinet No. 4347.

FORM E.

Similar to preceding form, 23.5 mm. long. Both the acute lower and the blunt upper tooth are present, one above the

other, as very feebly developed protuberances.

Type: 1 ♂, Mt. Airy, P(ENNSYLVANI)A. Coll. P. Laurent, Geo. M. Greene collection, U. S. N. M.

FORM F.

Each mandible has the acute lower tooth as a small denticle; basally from this tooth a second not so well developed; blunt upper tooth lacking on both mandibles. Length 20 mm.

Type: 1 ♂, Nashville, TENN(ESSEE), 11-23, Osborn. Wickham Collection 1933, U. S. N. M.

FORM G.

Left mandible with an acute lower tooth moderately well developed, the right mandible with the acute lower tooth developed only as a small denticle, the normal blunt upper tooth lacking on both. 19.75 mm. long.

Type: 1 ♂, Gipsy Moth Lab., July 8, 1910. At arc lights. Wilmington, MASS(ACHUSETTS). 1910. U. S. N. M.

PSEUDOLUCANUS CAPREOLUS form MUTICUS (Thunb.). FIG. 5.

Edentate form, to which Thunberg[1] applied the name *muticus,* 23 mm. long, fig. 5. Mandibles nearly straight for two-thirds their length, thence gently curved to apex; broad to about the middle, suddenly tapered to a point; no trace of either tooth on either mandible.

1 ♂, Plummers Island, M(ARYLAND)D. 1. 7. 19. Schwarz and Barber Collection. U. S. N. M. Several others, not as yet pinned, from Deer Lodge, Tenn., in the writer's possession.

It is interesting to note that, out of the five multidentate specimens, three are from the State of Tennessee. In some quarters, especially continental Europe, these would be considered as "Uebergänge," "Brücken" or "Geographische Rassen." However, this interpretation is unacceptable, in view of the two specimens taken at some distance from Tennessee, i. e., in Massachusetts and Pennsylvania. These specimens lend support to my statement[2] that certain forms, thus far described as subspecies or regional races, will, at some time, be taken throughout the range of a species and lead us to deny to these so-called subspecies or geographical races the status bestowed upon them.

[1] THUNBERG, C. P. Lucani Monographia, Mem. Soc. Nat., Moscow, I. p. 198 (1806).

[2] BENESH, B. Some notes on Boreal American Dorcinae. Trans. Amer. Ent. Soc. LXIII, p. 14 (1937).

An Annotated List of The Butterflies of Nebraska (Lepid.: Rhopalocera).

By R. A. LEUSSLER, Omaha, Nebraska.

(Continued from page 218)

76. AGLAIS J. ALBUM (Bdv. and Lec.). A dozen specimens taken in War Bonnet and Monroe canyons, Sioux County in July, 1917, and many more seen. One pupa found on black birch July 20, which gave forth its butterfly July 24.

77. A. MILBERTI (Godt.). Not rare in Sioux County in late June. Has not been recorded from other parts of the state.

78. A. ANTIOPA (L.). Found wherever elm or willow grows; two broods, latter half of June and middle of August, the latter hibernating.

79. CYNTHIA ATALANTA (L.). Very common over the entire state; at least two broods, for it is on the wing from April to October.

80. C. VIRGINIENSIS (Dru.). Found everywhere in the state. Common in most years but rare in others. Flies from May to October.

81. C. CARDUI (L.). Found everywhere in the state, and usually common; several broods.

82. JUNONIA COENIA Hbn. Fairly common, at least in the eastern part of the state; two broods, June and August.

83. BASILARCHIA ARTHEMIS (Dru.) race ASTYANAX (Fabr.). Common in the eastern part of the state. Two broods, June and August. Specimens of forms *viridis, inornata,* and *purpuratus* have been taken at Omaha.

84. B. WEIDEMEYERII (Edw.). Very abundant in the canyons of Sioux County in June; also 1 specimen Belmont, May 13, 1890 (Coll. Univ. Nebr.). Just where in the state this species replaces the preceding is not, at present, known.

85. B. ARCHIPPUS (Cram.). Common. Has been taken in all parts of the state; two broods, June and August. Specimens with the median black line on secondaries obsolescent, ab. *lanthanis* Cook and Watson, are occasionally found.

86. CELTIPHAGA CELTIS (Bdv. and Lec.). Fairly common; typical in the eastern part of the state, but undergoing a change as we go westward. Sioux County specimens are extremely large, and the majority of them have two ocelli on primaries; they vary in ground color from pale grey and dark grey to a decided red-fulvous. This race is nearest to the form which Holland figures as *montis* (Edw.) but which, according to my

understanding is not true *montis*. Specimens from the central part of the state are intermediate.

C. CELTIS ab. INORNATA (Wolc.). An extremely interesting aberrant individual was taken near Ashland June 14, 1913 (Wolcott) in which the median band of white spots on fore-wing is wanting, and the markings on upper side of hind wings are obliterated, giving the insect a strange appearance. This ab. was described and figured in Ent. News, March, 1916, by Dr. Wolcott. Type, now in the writers' collection.

87. C. CLYTON (Bdv. and Lec.). Found at Omaha and vicinity where it is quite plentiful. Single brooded, but butterflies emerge over an extended period. The earliest emerging ones are mostly *clyton clyton*, while the later ones are mostly form *proserpina* (Scud.). From one laying of eggs there was produced every gradation from *clyton clyton* to *clyton proserpina*.

88. ANAEA ANDRIA (Scud.). Common at Lincoln, Meadow and Oconto; less so at Omaha. Has also been at Cedar Bluffs and Mitchell (Dawson). Flies in October, hibernates and flies again in the spring.

89. LIBYTHEA BACHMANII (Kirt.). Not common. Occasionally met with at Omaha and Lincoln, and has been taken at Kearney (Black) and Mitchell (Dawson). On October 20, 1916, Dawson observed a great number at Mitchell, apparently migrating.

90. STRYMON MELINUS (Hbn.). Fairly common as a rule. Has been taken in every month from May to October, and clear across the state from Omaha to Harrison.

91. S. ACADICA (Edw.). This also has been taken in the eastern, middle and western part of the state. Common at Harrison and Oconto. Flies in July.

92. S. TITUS (Fabr.). This also is restricted to certain localities, but has been found entirely across the state. Flies in July and is fond of the flowers of butterfly weed (Asclepias tuberosa).

93. S. EDWARDSII (Saund.). Found, so far, only at Omaha, where it was extremely rare until July, 1929, when it appeared in large numbers in one locality having a growth of young scrub oak and butterfly weed, and it has been found there in abundance every year since.

94. S. CALANUS (Hbn.). Found in restricted localities in various parts of the state. In these localities it is sometimes found in numbers. Omaha, Lincoln, Rulo and Bazile Mills. Middle of June to middle of July.

95. S. LIPAROPS (Bdv. and Lec.) race STRIGOSA (Harr.). Rare. Specimens from Sioux County; also 1 from West Point. (Coll. Univ. Nebr.); 1 from Bazile Mills June 17, 1918 (Shoemaker) and 1 from Wauneta June 21, 1933.

96. MITOURA SIVA (Edw.). A single specimen on cedar, in Bull Canyon, Banner County, June 2, 1919. As the slopes of this canyon abound in cedars, *siva* may be expected to be established here, but the day I visited this region was most unfavorable for collecting—cloudy, with temperature near freezing.

97. INCISALIA HENRICI (G. & R.). Found in numbers in a draw or ravine near Omaha, April 17, 18, 24, and May 8, 1915. In the following year a single specimen was found in the same locality but none have been found since although diligently searched for year after year.

98. I. ERYPHON (Bdv.). Common in Sioux County in late May and early June. With respect to the band on under side of forewings, as well as other characters, the Sioux County form appears to be intermediate between eastern *niphon* and western *eryphon* but most of the specimens are closer to the latter.

99. FENISECA TARQUINIUS (Fabr.). Rare. Several specimens taken in various localities in and about Omaha; also one specimen at Lincoln. One full grown larva found at Omaha, July 26, 1913, among a colony of wooly plant lice reared to imago August 4.

100. LYCAENA DIONE (Scud.). Common. Found everywhere in the state where bitter dock grows. Single brooded. Latter part of June.

101. L. THOE (Guer.). Common. Extends at least as far west as Kearney and Oconto. Frequents moist area where knot weed grows. Double brooded, June and August. The species shows a tendency toward fusion of spots, to examples of which Gunder has given the name tr. f. *wyatti*.

102. L. HELLOIDES (Bdv.). Not found in the eastern part of the state but quite common in Cherry County and further west. At least two broods; first early June, second after the middle of July.

103. L. HYPOPHLAEAS (Bdv.). Rare. Present at Omaha in fair numbers, in a meadow well sprinkled with white clover, in the years 1915 and 1916, since which time, however, it has been met with only once or twice.

104. L. RUBIDUS (Behr) race *sirius* (Edw.). Common in the western part of the state. Taken in large numbers at Harrison the latter half of June, 1917, on lupine. Spotting on

under side of hind wing is variable, very distinct in some specimens and only faintly indicated in others.

105. LEPTOTES MARINA (Reak.). Although apparently a long ways from home, fresh specimens of this species have been taken both at Omaha and Lincoln. Omaha June 25, 1914; September 3, 7, 16, 17, October 7, 1916; Lincoln October 7, 1918.

106. BREPHIDIUM EXILIS (Bdv.). Another California species which occasionally makes its appearance in Nebraska. 1 specimen, Lincoln August 10, 1901 (J. C. Crawford); 1, Lincoln, July 11, 1920 (R. W. Dawson); 1, Plattsmouth, September 16, 1931 (Leussler).

107. HEMIARGUS ISOLA (Reak.). Not uncommon and found everywhere in the state. On the wing from May to October; most numerous in September.

108. EVERES COMYNTAS (Godt.). Exceedingly common in the eastern half of the state; quite variable, the males of the summer brood having a much broader black border than those of the earlier brood.

E. COMYNTAS race HERII (Grin.). Sioux County specimens match well with specimens from Arizona.

109. PLEBEJUS MELISSA (Edw.). Extremely common in the western part of the state but growing less so as we go eatsward, until at Lincoln it is very rare, and at Omaha I have taken but a single specimen (September 14, 1918), the only one seen in 28 years collecting there. Double brooded June and August.

110. P. ICARIOIDES race LYCEA (Edw.). Extremely common in Sioux County where long series have been collected in June and July. Quite variable in size, shade of blue and width of black border. The under side is more constant. Not recorded from elsewhere in the state.

111. P. SHASTA (Edw.). race MINNEHAHA (Scud.). Apparently rare. 1 male and 1 female, Sioux County, June 21, 1890. (Coll. Univ. Nebr.); 1 male, Sioux County, June 21, 1911 and several of both sexes same locality July 14, 1917 (Leussler).

112. P. ACMON (West and Hew.). Specimens from the following localities: Clear Lake, Cherry County; Harrisburg, Banner County; Harrison, Sioux County. Double brooded, June and August. These should perhaps be referred to *lupini* (Bdv.). The dark marginal border is broad and not clearly defined, and the orange band on secondaries is composed of more or less separated spots rather than a continuous band.

113. PHAEDROTES PIASUS (Bdv.). race *daunia* (Edw.). Found in Sioux County, in June, but not very common.

114. GLAUCOPSYCHE LYGDAMUS (Dbldy.) race ORO (Scud.). The range of this species in the state is restricted to the extreme western part. Dr. Wolcott and I found it abundant near Harrisburg, May 30, 1919 and have also taken it in Sioux County in June.

115. LYCAENOPSIS PSEUDARGIOLUS (Bdv. and Lec.). The spring form of this species is one of the earliest butterflies, appearing about the middle of April; fairly common in eastern part of the state. Very rarely a specimen is met with approaching form *marginata* (Edw.).

L. PSEUDARGIOLUS gen. aest. NEGLECTA (Edw.). This summer form is more abundant than the spring form; often found in large numbers in June and July and again in August. There is considerable variation in size of individuals of the summer brood.

116. EPARGYREUS TITYRUS (Fabr.). Common everywhere in the state; On the wing from May to October. Larvae on wistaria, locust and rose acacia.

117. THORYBES PYLADES (Scud.). Rather common in open spaces in or near woods, in June and July. Found from the eastern to the western state boundary.

118. T. DAUNUS (Cram.). Less common than the preceding though as widely distributed. Has been taken as early as May 8, and as late as September 5, and in every month between.

119. PYRGUS SCRIPTURA (Bdv.). Rare. A single specimen, Prairie Dog Creek, near Harrison, Sioux County, June 29, 1911 (Wolcott).

120. P. TESSELLATA (Scud). One of our very common skippers; on the wing everywhere from May till late in October.

121. PHOLISORA CATULLUS (Fabr.). Very common everywhere; and, like the preceding species, on the wing from May to October.

122. P. HAYHURSTII (Edw.). Not nearly as common as *catullus* and far more local. Specimens from Omaha, Cedar Bluffs and Roca. Two broods, latter part of May and Middle of July.

123. ERYNNIS BRIZO (Bdv. and Lec.). Rare. A few specimens taken at Omaha and Weeping Water. Earliest capture April 23, latest May 15.

124. E. PERSIUS (Scud.). Common. Two broods; first

very end of April, second middle of August. Individuals of the later brood average larger than those of the earlier brood. Specimens from various points in eastern half of state.

E. PERSIUS race AFRANIUS (Lint.). Fairly common in Sioux County late in May and early June. Small race, hoary gray on upper surface, with distinct light fulvous spots on hind wings.

E. PERSIUS race LUCILIUS (Scud. and Burg.). Rare. Occasional specimens taken at Omaha match up well with specimens from Great Notch, N. J.

125. E. MARTIALIS (Scud.). Fairly common in one piece of native prairie land on the outskirts of Omaha, the latter half of July; also found, though far less common, in the first half of May. Specimens also from the sand hills near Halsey. Apparently very local.

126. E. JUVENALIS (Fabr.). Common and distribution general. Double brooded; the first brood, latter part of April and early part of May being by far the more numerous.

127. E. HORATIUS (Scud. and Burg). Less common than *persius* and *juvenalis*. Early May and again in late summer. Omaha, Cedar Bluffs and Nebraska City.

128. E. FUNERALIS (Scud. and Burg). Rare. 1 specimen, Cedar Bluffs, May 30, 1913 (Wolcott) and 1, Fremont, May 30, 1921 (Leussler).

129. ANCLOXYPHA NUMITOR (Fabr.). Very common in grasses around small streams; appears about June 1 and is present then throughout the summer. Omaha, Roca, Valley.

130. OARISMA GARITA (Reak.). Quite common near Harrison in late June. Frequents moist grassy spots and is probably to be found elsewhere in the western part of the state also. Specimens are somewhat larger than those from Colorado and Arizona.

131. CHAEREPHON RHESUS (Edw.). A single specimen taken in Sioux County by Merritt Cary in May, and now in the Collection of the University of Nebraska.

132. C. SIMIUS (Edw.). Fairly common in Sioux County where a number of specimens were taken in the latter part of June, 1911, and a larger number in July, 1917. It has a curious habit of settling deep down on the flower heads of white thistle with wings folded tightly back, in which position it greatly resembles the tuft of the flower and is easy to approach.

133. HESPERIA UNCAS (Edw.). Not uncommon in the western part of the state. I have taken it at Valentine, Benkleman and Harrison. Flies in June and July.

(To be continued)

The Egg-laying and Early Stages of the Robber Fly, Erax aestuans. (Diptera: Asilidae).

By EDWARD G. REINHARD, University of Scranton.

During August, 1932, while vacationing at Winthrop Harbor in northeastern Illinois, I became interested in observing the egg-laying habits of a common robber fly, later determined by Mr. C. T. Greene of the U. S. Bureau of Entomology as *Erax aestuans* L. These flies attracted attention because of their curious partiality for the fruiting spikes of the self-heal, *Brunella vulgaris,* a very common plant in the vicinity, which they used as shelters for their eggs. Since the behavior of the Asilidae has been a neglected field of study in American entomology the following observations, though scanty, seem worthy of record.

I first noticed females engaged in oviposition on August 8th and saw the flies *in copula* on the same day. There is no reason to suppose, however, that this was the very beginning of the mating season, since eggs were collected on August 9th from which the larvae had already hatched. Thereafter, for a period of ten days, whenever the weather was clear and warm, females could be found in abundance probing with their ovipositors the dried heads of *Brunella* or rarely of some other plant. When the capsules were examined after a fly had been at work they usually showed a clutch of eggs deposited on top of the seeds.

On the day following my initial observation it rained, and this proved a fortunate occurrence for it taught me a simple method for finding the eggs. When the fruiting spikes of *Brunella* are moistened the individual capsules stand out at right angles to the main stem and their lips open widely so that one can easily see what is within. Instead of prying each capsule apart to find the one containing *Erax* eggs, as must be done when the spikes are dry, it is only necessary to dip the spikes in water for a moment. Then, thanks to hygroscopic unfolding movements, the capsules gape open and reveal their contents to a quick glance of inspection.

By this method quite a number of egg masses were found in spikes collected purely at random. It also demonstrated what a haven these seed pods were for various small arthropods seeking seclusion. Spiders, mites, a sleeping little wasp, cocoons of *Chrysopa,* and pupae of microlepidoptera were some of the occupants that found shelter there.

A single capsule of *Brunella* may contain as many as ninety eggs of *Erax aestuans,* although the average number of eggs per cluster amounted to about forty. When the flies oviposited in *Achillea, Rudbeckia,* or *Verbascum* heads, as occasionally happened, the available space limited the eggs to a single one per crevice, or to small clusters of four to ten.

The eggs of this species of robber fly measures approximately 0.8 mm. x 0.25 mm. The shell is rather tough, does not lose its shape after the embryo has hatched, and bears a fine granular network, presumably the imprint of the chorion-secreting cells.

Eight freshly-laid egg masses, totalling 440 eggs, were placed in gelatine capsules and kept under observation to determine the incubation period. Hatching began on the seventh to ninth day after laying and continued for each cluster over a period of three or four days. Movement could be detected within the egg two days before hatching. The larva is doubled up within the shell, head touching tail. By a forward thrust of its hooked head the larva ruptures the shell, then slides in and out the opening to enlarge it, and finally squeezes through head first and crawls away.

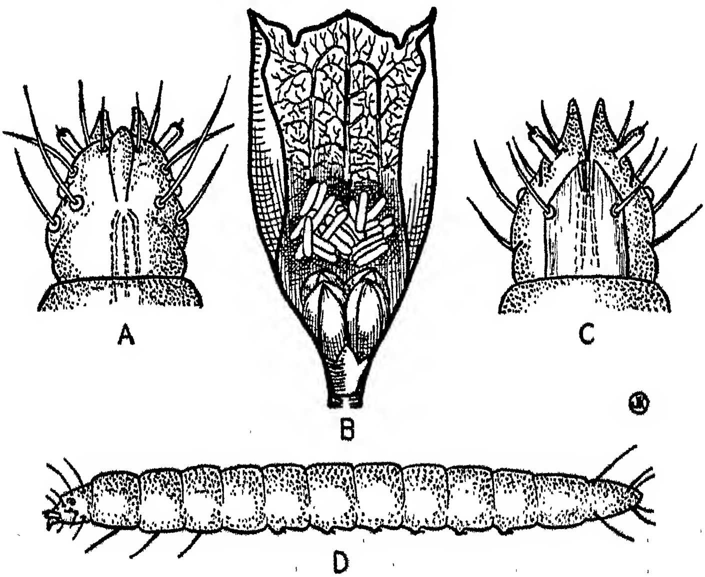
The young larva can cling with its posterior extremity and when crawling leaves a moist trail. Apparently it excretes from the anal region a fluid that assists the larva in holding on to objects over which it creeps.

Several newly-hatched larvae were placed on *Brunella* spikes to determine how they would descend to earth. All simply fell off when they eventually reached an extremity. Larvae put on the surface of a can of loose earth penetrated to the bottom, but a batch of newly hatched larvae placed on the hard packed soil outdoors failed to penetrate and were found the next day

still alive but lying where they had been placed.

On the assumption that *Erax* larvae are predaceous on white grubs, as several writers have stated, I tried to feed my maggots by providing them with small *Lachnosterna* grubs. Not one attached itself to the grubs; instead the maggots died but the grubs survived. An attempt to feed them on ant larvae also proved unsuccessful. Much digging in the vicinity of the robber fly nesting sites failed to produce asilid larvae, and, vacation days having come to an end, I was forced to leave Winthrop Harbor without carrying the life history of *Erax aestuans* any farther. Later, I had an opportunity to read D. Melin's thorough work "Biology of the Swedish Asilids" (Zoologiska Bidrag fran Uppsala, *8*:1-317, 1923) and learned there that despite common belief asilid larvae are not carnivorous as a rule but feed on vegetable substances of a solid nature.

The chief structural features of the first larval instar of *Erax aestuans* are illustrated in the accompanying figures.



Eggs and first instar larva of *Erax aestuans* L. A. Dorsal view of head of larva, X 150. B. Capsule of *Brunella vulgaris* opened to show eggs lying in cavity above the seeds, X 7. C. Ventral view of head of larva, X 150. D. Lateral view of larva, X 40.

Notes on Utah Plecoptera and Trichoptera[1].

By G. F. KNOWLTON and F. C. HARMSTON [2].

Stone flies and caddis flies form an important source of fish food in most western lakes and streams. Incomplete knowledge of the species present and their distribution in Utah led to the following report.[3]

PLECOPTERA—STONEFLIES.

ACRONEURIA PACIFICA Banks. Brigham Canyon, June 18, 1937; Duchesne; Logan; Mantua; Roosevelt, March 21, 1937; Sevier; Trout Creek (E. Gardner). Also at Lamezella Canyon, New Mexico (H. B. Stafford) and Yellowstone National Park, Wyoming.

ALLOPERLA COLORADENSIS (Bks.). Big Cottonwood Canyon, June 15, 1937; Logan.

CAPNIA COLUMBIANA Clsn. Logan, March and May, 1937; Logan Canyon, April, 1937.

C. ELONGATA Clsn. Logan Canyon, April 14. 1937.

C. NANA Clsn. Northern Utah.

DICTYOPTERYGELLA KNOWLTONI Frison. Logan, June 23, 1929.

EUCAPNOPSIS BREVICAUDA Clsn. Big Cottonwood Canyon, April 24, 1937; Brigham Canyon; Logan Canyon.

ISOPERLA FULVA Clsn. Blacksmith Fork Canyon, May 4, 1937; Logan Canyon (C. F. Smith); Ogden Canyon; Weber Canyon.

I. PETERSONI Clsn. Logan, October 5, 1937; Logan Canyon (D. E. Hardy).

LEUCTRA BRADLEYI Clsn. Provo Canyon, April 10, 1917.

NEMOURA CALIFORNICA Clsn. Roosevelt, June 16, 1935.

N. CINCTIPES Banks. Brigham Canyon, May 1, 1937; Logan; Salt Lake City; Sunset; Wellsville.

N. GLABRA Clsn. Brigham Canyon, March 29, 1937; City Creek Canyon; Logan Canyon; Mantua; Morgan; Salt Lake City.

N. LOBATA Frison. Logan and Logan Canyon, October, 1937 (L. L. Hansen).

PERLODES AMERICANA (Klap.). Logan Canyon, April 20, 1937.

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[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

[2] Associate entomologist and research assistant, respectively.

[3] The writers are indebted to Drs. T. H. Frison and H. H. Ross for the identification of most of the material recorded. Unless otherwise indicated, collections were made in Utah and by one or both of the writers.

PERLOMYIA UTAHENSIS N. & C. Brigham Canyon, April 24, 1937.

PTERONARCELLA BADIA Hag. Blacksmith Fork Canyon, July 9, 1937; Fruitland, September 17, 1936; Logan, (W. P. Nye); Strawberry Valley, May 2, 1935; Whiterocks.

PTERONARCYS CALIFORNICA Newport. Big Cottonwood Canyon, June 27, 1937; Blacksmith Fork Canyon; Logan (R. E. Nye); Ouray; Salt Lake City; Sevier; Springville; Uinta Mountains.

P. PRINCEPS Banks. Logan, July 23, 1929; Trout Creek (J. A. Rowe & W. L. Thomas).

SIALIS CORNUTA Ross. Fruitland, March 30, 1937; Red Creek.

TAENIOPTERYX NIGRIPENNIS Bks. Blacksmith Fork Canyon, May 4, 1937; Brigham Canyon; City Creek Canyon; Farmington; Mantua; Ogden; Weber Canyon.

T. OCCIDENTALIS Bks. Logan Canyon, March 14, 1937.

TRICHOPTERA—CADDIS FLIES.

AGAPETUS DEBILIS Ross. Logan Canyon, August 29, 1937 (W. P. Nye).

ARCTOPSYCHE GRANDIS Banks. Logan, May 30, 1937; Spanish Fork, July 9, 1937 (Knowlton-H. E. Dorst). Also at Riverdale, Idaho, July 17, 1937 (C. F. Smith-Harmston).

ASYNARCHUS CENTRALIS (Bks.). Logan Canyon, August 1, 1937 (Smith-Harmston).

BRACHYCENTRUS ASPILUS Ross. Logan, August 8, 1937; Logan Canyon, July 25, 1937.

B. OCCIDENTALIS Bks. Blacksmith Fork Canyon, May 4, 1937; Logan, May 1, 1937; Logan Canyon, May 8, 1937 (Nye).

CHEUMATOPSYCHE COMPYLA Ross. Currant Creek, June 30, 1937.

C. PETTITI Bks. Logan Canyon, July 25, 1937; Wellsville, May 1, 1937.

CHIMARRHA UTAHENSIS Ross. Gandy, September 26, 1936 (C. J. Sorenson).

DISCOSMOECUS ATRIPES (Hagen). Logan, September 13, 1936.

D. UNICOLOR Bks. Logan, August 28, 1937.

DOLOPHILUS GABRIELLA Bks. Logan, September 28, 1937.

GLOSSOSOMA ALASCENSE Bks. Mantua, May 1, 1937.

G. VERDONA Ross. Big Cottonwood Canyon, April 24, 1937; Kanesville, May 15, 1937; Logan Canyon, April 20, 1937.

GLYPHOSYCHE ORMIAE Ross. Logan, November 3, 1934 (C. F. Smith); Smithfield, October 20, 1936 (H. F. Thornley).

G. SUBBOREALIS Bks. Logan, October 3, 1933 (T. O. Thatcher).

Hesperophylax consimilis Bks. Northern Utah, 1937.

H. magnus Bks. Logan, August 14, 1937 (K.-Nye); Manila, August 11, 1937; Monticello, September 4, 1937.

H. occidentalis Bks. Brigham, April 24, 1937; Logan, September 6, 1937 (K.-Nye); Ogden Canyon, June 21, 1937 (K.-Smith).

Hydropsyche californicus Bks. Logan Canyon, October 5, 1937 (D. E. Hardy).

H. cockerelli Bks. Blacksmith Fork Canyon, June 20, 1937 (Smith-Harmston); Ogden, August 18, 1937; Weber Canyon, June 10, 1937 (C. J. Davis).

H. occidentalis Bks. Logan, August 14, 1937; Ogden Canyon, June 21, 1937 (K.-Hardy); Spanish Fork, July 19, 1937 (K.-Dorst); Weber Canyon, August 18, 1937.

H. oslari Bks. Logan, August 16, 1937; Logan Canyon, July 25, 1937.

Lepidostoma knowltoni Ross. Clinton, June 21, 1936.

L. pluvialis (Milne). Logan, July 29, 1937; Logan Canyon, July 4, 1937 (Smith-Harmston).

L. unicolor Bks. Logan, August 9, 1937.

Limnephilus externus Hagen. Logan, August 20, 1937; Strawberry Valley, August 10, 1933 (E. W. Anthon).

L. productus Hagen. Logan, August 14, 1937 (K.-Nye); Spanish Fork, August 17, 1937.

L. taloga Ross. Indian Writings, San Rafael, September 11, 1937 (W. P. Nye).

L. thorus Ross. Blue Creek, August 28, 1934 (Smith).

Macronema zebratum Hagen. Roosevelt, August 14, 1937.

Oecetis inconspicua (Walker). Daniel's Canyon, June 30, 1937; Delta, August 18, 1937.

Oligophlebodes minuta Bks. Brigham Canyon, June 27, 1937 (G. F. & M. W. Knowlton); Currant Creek, June, 1937; Smithfield, July 11, 1937 (Smith & Harmston).

Philoptamus aequalis Bks. Logan, July 5, 1937 (G. F. & M. W. Knowlton).

Rhyacophila basalis Bks. Logan Canyon, July 4, 1937 (Smith-Harmston).

R. verrula Milne. Logan, October 2, 1937 (R. E. Nye).

Triaenodes tarda Milne. Logan, August 29, 1937.

Migration of Monarch Butterflies (Lepid.: Danaidae).

By Charles A. Evans, M.D., Department of Bacteriology, University of Minnesota, Minneapolis.

In his monograph on the "Migration of Butterflies," Williams [1] devotes an entire chapter to the Monarch (*Danaida plexippus*). By collecting and correlating records from all over the country, he shows that this species, which breeds from the Gulf States north to Hudson's Bay, congregates in large numbers to migrate southward in the fall. Records from Florida and California show that at least in these two states it spends the winter, as vast numbers have been seen clinging to pine trees at this season. In late February or early March, they disappear from these locations and begin to move northward as the milkweed comes out. The return trip is inconspicuous as the butterflies go singly or in small groups instead of in the spectacular masses which are seen in the fall.

Williams was able to find only three records of migrating monarchs in Wisconsin. All three were observations in late August or early September, two in 1868 at Madison and Racine, and one in 1900 at Milwaukee. In September, 1935, I observed a migration of monarch butterflies near Grafton, Wisconsin, about 20 miles north of Milwaukee. On September 4, while seated about 30 yards from the shore of Lake Michigan, I counted 200 drifting between myself and the lake in 10 minutes and 20 seconds. All were going southward, moving in a persistent but not hurried manner and stopping occasionally on some tree or flower. They did not venture out over the lake. For at least a quarter of a mile back from the lake, they were equally numerous. I was unable to investigate beyond this distance. However, calculating on the basis of the 200 butterflies counted, it can be estimated that they were passing southward at the rate of approximately 17,000 an hour in the quarter mile strip observed. This movement continued at the same rate all day and had been going on for several days before September 4th. On the following days the number of passing monarchs decreased rapidly until on September 9th none were seen on a brief visit to the same place. On September 10th

only one of these butterflies was seen and that was frantically trying to find a way through a wire fence which blocked its way to the south. It was watched several minutes flying against the fence repeatedly, trying to find a way through. The persistence of this butterfly in attempting to go southward, although any other direction would have been much easier, is interesting. Williams states that the first purpose of this monograph is "to establish by force of evidence the reality and especially the wilful nature of the undirectional flights" of butterflies. Wilful is defined as "governed by the will without regard to reason." Certainly this butterfly presented a clear-cut example of the wilful nature of an undirectional flight.

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An Unusual Nesting Site of Polistes rubiginosus Lept. (Hymenoptera: Vespidae).

By HAROLD I. O'BYRNE, Urbana, Illinois.

Rau has on several occasions (1929a, '29b, '31) described the nesting sites of *Polistes rubiginosus* Lept. as being in dark, inaccessible places within walls of buildings or in hollow trees. Nesting places seen by me have likewise been in the dark—usually in hollow trees, with entrances through holes or cracks. An exception in this respect was a nest which I observed near the south end of Reelfoot Lake, Tennessee, on April 17, 1938. This nest was in the open, attached to a branch of a small shrub about one foot above the ground. It had been newly started and consisted of only six or seven cells, including some unfinished ones. Several wasps were clinging to it—there may have been as many as eight, but the exact number was not determined because some took flight as I approached. These wasps evidently had hibernated, since it was too early in the season for a new brood to have matured.

Of the spring behavior of *P. rubiginosus,* Rau says (1929a, '30) that the females return from their place of hibernation to the old nesting site, but he has not described the resumption of nesting activity in the spring. However, the behavior of *P. annularis* Linn. at this season is of interest in this connection: At Clifton Terrace, Illinois, on April 24, 1914, Rau (1918, pp. 287-8) observed a number of queens of *annularis* clustered on the nests of the preceding year; but there were also a few nests in process of construction, on each of which from one to four queens were seen. This suggests that collaboration by more than one female in building the nests may take place in the spring. The nest of *P. rubiginosus* at Reelfoot Lake likewise seemed to be the result of cooperation by several females. Although Wheeler (1928, pp. 73 and 101) states that in temperate regions nests of *Polistes* are founded by a single fecundated female while in the tropics they may be founded by a fecundated female with several workers who are her sisters, the foregoing observations by Rau on *P. annularis* and by myself on *P. rubiginosus* suggest that the condition that prevails in the tropics has not been entirely lost in temperate regions.

It is not surprising that the spring behavior of *rubiginosus* should resemble that of *annularis* in this respect; but the selection of an exposed site instead of a dark, protected place by the wasps founding this single *rubiginosus* colony at Reelfoot Lake is a noteworthy departure from the usual nesting behavior of this species.

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Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Bedard, W. D.**—An annotated list of the insect fauna of Douglas fir (Pseudotsuga mucronata) in the northern Rocky Mt. region. [4] 70: 188-197. **Carpenter, Snyder, Alexander, James, Hull.**—Fossil insects from the Creede formation, Colorado. Pt. 1. Introduction, Neuroptera, Isoptera and Diptera. [5] 45: 105-119, ill. **[Frison, T. H.]**—Entomologists Don't Rate. [12] 31: 635-636. **Gilliatt, Frederick C.**—Obituary by A. Kelsall [4] 70: 197-198. **Hyslop, J. A.**—Giving meaning to the terms, brood and generation. [12] 31: 557-559. **Lagloire, P.**—Le guide de l'amateur d'insects [98] 65: 240-252, ill. √**Laing, J.**—Host-finding by insect parasites. I. Observation on the finding of hosts of Alysia manducator, Mormoniella vitripennis and Trichogramma evanescens. [Jour. Anim. Ecol.] 6: 298-317, ill. **Lameere, A.**—Precis de Zoologie. Caracteres fondamentaux des Arthropodes, les Arachnomorphes, les Crustaces. Les Myriapodes caracire fondamentax des insectes. Les insectes inferieurs. [U. Bruxelles Inst. Zool.] 3, 1933: 212-531, ill.; 4, 1935: 468 pp., ill. **Mendes, L. O. T.**—Lista dos inimigos naturaes de Dysdercus spp., observados no Est. de Sao Paulo. [105] 9: 215-217. **Meyrick, Edward.**—Obituary by A. Busck. [10] 40: 177-179, ill. **Palmer, E. L.**—Some common fresh-water insects [Nat. Mag.] 31: 477-484, ill. **Pyenson, L.**—The problems of applied entomology in Pernambuco, Brazil: Pt. 2.—A survey of some of the pests of the crops of Pernambuco [105] 9: 16-31. **Rodeck, H. G.**

—Type specimens of fossils in the University of Colorado Museum. [Univ. Col. Studies] 25: 281-299. **Salt. G,**—Experimental studies in insect parasitism, VI.—Host suitability. [22] 29: 223-246, ill. **Severin, Guillaume.**—Obituary by A. Lameere. [33] 78: 313-314, ill. **Smart, J.**—Notes on the insect fauna of the bromeliad, Brocchinia micrantha, of British Guiana. [8] 74: 198-200, ill. **Smith, R. C.**—Some Phases of entomological writing from the viewpoint of the reader. [12] 31: 563-565. **Stanley & Smallman.**—A method of determining the mean speed of movement of insects in a mass of flour. [Can. Jour. Res.] 16, Sec. D: 221-224, ill. **Whitehead, F. E.**—A proposed national contest for entomology students. [12] 31: 566-568.

ANATOMY, PHYSIOLOGY, ETC.—**Andre, M.**—Elevages de volailles decimes par le Tyroglyphus farinae. (Acariens). [Bull. Soc. Zool. France] 62: 366-367. **Brauns, A.**—Dieflugelruckbildung bei der Strandfliege Conioscinella brachyptera (Dipt.: Chloropid.) und die Beiziehungen zur Ausbilding der Flugelsinnes Kuppeln. [34] 123: 281-295, ill. **Butler, C. G.**—On the ecology of Aleurodes brassicae (Hemiptera). [36] 87: 291-311, ill. **Evans, A. C.**—Physiological relationships between insects and their host plants. I.—The effect of the chemical composition of the plant on reproduction and production of winged forms in Brevicoryne brassicae (Aphid., Hemipt.). [35] 25: 558-572. **Farstad, C. W.**—Thelyotokous parthenogenesis in Cephus cinctus (Hymen.: Cephidae). [4] 70: 206-207. **Grandjean, M. F.**—Otodectes cynotis et les pretendues trachees des Acaridiae. [Bull. Soc. Zool. France] 62: 280-290, ill. **Hopkins, G. H. E.**—Function of the "gills" in mosquito larvae. [31] 142: 482. **Kozhanchikov, I. W.**—The peculiarities of gaseous metabolism in insect tissues. [Comptes. Rend. Acad. Sci. U. S. R. R.] 19: 759-761. Physiological conditions of cold-hardiness in insects. [22] 29: 253-262, ill. **McGregor, S. E.**—Environmental factors and size variations in honeybee appendages. [12] 31: 570-573, ill. **Milne, M. J.**—Case-building in Trichoptera as an inherited response to oxygen deficiency. [4] 70: 177-180. **Patay, R.**—Anatomie, histologie et physiologie des tubes de Malpighi du Doryphore (Leptinotarsa decemlineata (Chrysomel.). [Bull. Soc. Zool. France] 62: 174-186, ill. **Patterson, N. F.**—On the external morphology of South African specimens of Micromalthus (Coleo.) [36] 87: 287-290, ill. **Poisson & Pesson.**—L'appareil circulatoire d' Icerya purchasi (Coccid.,

Monophlebinae). [Bull. Soc. Zool. France] 62: 431-435, ill. **Pringle, J. A.**—Observations on certain wood-boring Coleoptera occurring in South Africa (Lyctidae & Bostrychidae). [36] 87: 247-270, ill. **Pringle, J. W. S.**—Prosprioception in insects. I. A new type of mechanical receptor from the palps of the cockroach. II. The action of the companiforms sensilla on the legs. [Jour. Exp. Biol.] 15: 101-113, ill.; 114-131, ill. **Quadri, M. A.**—The life-history & growth of the cockroach Blatta orientalis. [22] 29: 263-276, ill. **Salt, G.**—The egg-parasite of Sialis lutaria; a study of the influence of the host upon a dimorphic parasite. [116] 29: 539-553. **Wilson, F.** — Some experiments on the influence of environment upon the forms of Aphis chloris (Hemipt.). [36] 87: 165-180, ill.

ARACHNIDA AND MYRIOPODA. — **Cameron, D.** — The northern fowl mite (Liponyssus sylviarum). Investigations at MacDonald College, Que., with a summary of previous work. [Can. Jour. Res.] 16: 230-254, ill. **Chamberlin, J. C.**—New and little-known false scorpions from the Pacific and elsewhere (Chelonethida). [75] 2, 11th Series: p. 259-285, ill. (k*). **Ewing, H. E.**—North American mites of the subfam. Myobiinae. [10] 40: 180-197, ill. (k*). **Grandjean, F.**—Sur quelques caracteres des Acaridiae libres. [Bull. Soc. Zool. France] 62: 388-398, ill. **Jacot, A. P.**—Thomas Say's free-living mites rediscovered. [5] 45: 121-132, ill. (*). **Michelbacher, A. E.** — The biology of the garden centipede Scutigerella immaculata. [Hilgardia] 11: 55-148. **Sellnick, M.**—Eine neue Milbengattung aus Sud- und Mittelamerika. [109] 5: 184-185.

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des Polymitarcys aux Ephoron et sur les Polymitarcys palearctiques. [33] 78: 381-394. **Snyder, T. E.**—See under General. **Spieth, H. T.**—Studies on the biology of the Ephemeroptera. I.—Coloration and its relation to seasonal emergence. [4] 70: 210-218. **Ulmer, G.**—Chilenische Ephemeropteren, hauptsachlich aus dem Deutschen Entomologischen Institut Berlin-Dahlem. [109] 5: 85-108, ill.

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SPECIAL NOTICES.—Dipteres Dolichopodidae.—L. O. Parent. [Faune de France] 35: 720 pp., ill. (K). **Revision of the Bombyliidae** of Southern Africa. By A. J. Hesse. [Ann. South African Mus.] 34: 1053 pp., ill. (K*).

BULLETIN OF THE CHEYENNE MOUNTAIN MUSEUM, being a catalogue of the original descriptions of the Rhopalocera from north of the Mexican border: Vol. 1, part 1, the Hesperioidea, by Ernest L. Bell, Colorado Springs, Colorado. 35 pages, price 50 cents.

This is the first of a series, others of which are announced as in process of publication. It lists 222 species and 41 races or forms, and is a valuable contribution to our knowledge of the skippers. The number of these insects discovered and named has increased with the years. Skinner's Synonymic Catalog of 1898 listed 182 species and 18 forms, Dyars' Catalog, of 1902, 195 species and 18 forms, the Lindsey, Bell and Williams' Denison University Bulletin of 1931 listed 215 species and 34 forms. The total number however is something less than 10 percent of the Hesperids flying in all the Americas. The nomenclature is the last word in this group, the generic names adopted being those that have strict priority in the literature, and the newer ones that have replaced those that have fallen through previous use elsewhere. All of the references listed, have, to my personal knowledge, been checked by Mr. Bell. The synonymy contains the insects that have been missidentified by authors, so that it may be expected that any figure in the books available to the student may be considered to represent the species unless found corrected in Bell's work. The latter will be found indispensable to all workers interested in the American Hesperioidea. ROSWELL C. WILLIAMS, JR.

THE GENUS SEPTOBASIDIUM. By JOHN N. COUCH. 480 pages, frontispiece, 60 text figures, 114 plates. The University of North Carolina Press. $5.00. Here is a book which, unfortunately, will be reviewed chiefly in purely botanical journals and filed on the botanical shelves in libraries and thus is likely to remain unknown to entomologists unless they come upon it accidentally. But it contains so much of entomological interest that it deserves review in entomological journals and would not be out of place in any entomological library. The reviewer, as a student of the scale insects, has long known that there are some species which are very intimately associated with certain fungi. But not being familiar with the literature of the fungi he was quite unaware of the fact that there is a botanist who is especially interested in this association. It has come, therefore, as a very pleasant surprise to learn that there is such a person and to receive for review an entire volume devoted to the genus *Septobasidium*, to which all the fungus species in question are referred. The pleasure is all the greater, in that the volume is extremely well printed and extremely well illustrated. The extraordinary symbiosis of insect, fungus and host

plant is considered in detail in connection with the fungus, *Septobasidium burtii* Lloyd, which occurs in association with *Diaspidiotus* (= *Aspidiotus*) *osborni* (Newell and Cockerell) on various species of oaks in our southeastern states. In addition a very considerable amount of information obtained from other species associated with other scales on other hosts is added. The story of these relationships is too long even to be abstracted here and the interested student must refer to the book. Dr. Couch points out that all the species of the fungi that he has studied cause damage to their host trees, but that this damage is due "not to the fungus directly but to the combination of fungus and scale insects." The nature of the damage is reviewed and control methods are suggested. A review of the geographical distribution of the host trees and host insects—the latter including two aphids—is presented. The identifications of the scale insects associated with the fungi in North America are by Harold Morrison, but unfortunately in the case of most of the foreign species—which constitute a very large part of the total—the scales are unidentified. The author remarks that "From the results so far obtained it appears that the greater number of species of *Septobasidium* are not limited to an association with one species of scale insect but may be associated with several." A few errors in scale insect names may be noted. *Cerococcus* is mis-spelled as *Cerecoccus* and this generic name is erroneously applied to the species properly to be called *Mycetococcus ehrhorni*. The generic name *Chionaspis* is employed for the species *biclavis* which for more than forty years has been referred to *Howardia*. *Odonaspis* is mis-spelled as *Odanaspis*. Other errors in the list of scales are due merely to the chaotic state of scale insect taxonomy. In the section dealing with the taxonomy of the fungi nearly 175 species, from all parts of the world are listed. That these constitute but a small part of the species which probably exist is emphasized by the author, who points out that except for southeastern United States, no region in the world has been carefully combed for them. A bit of cooperation from those of us who collect scale insects seems to be called for.—G. F. FERRIS.

Erratum. ENTOMOLOGICAL NEWS, vol. xlix, page 262, line 30, for *Biological Extracts*, read *Biological Abstracts*.

Doings of Societies.

The fourteenth annual Rocky Mountain Conference of Entomologists was held at the University of Wyoming summer camp, Centennial, Wyoming, August 14 to 19, 1938. A total of 73, representing 11 states and the District of Columbia, attended. The following are those directly interested in entomology:

Jas. I. Hambleton, F. M. Wadley, Washington, D. C.; Don. B. Whelan, Nebr.; Vasco M. Tanner, Geo. I. Reeves, Utah; Robert Hawkins, Byrne Thrailkill, Wm. B. Owen, C. H. Gilbert, Herbert J. Stoles, Jr., Margaret Greenwald, A. W. Woodrow, Eugene C. Holst, A. P. Sturtevant, Wyoming; Maurice T. James, Bob Potts, C. R. Jones, C. P. Gillette, Theodore R. Hupper, Fred H. Kropf, John L. Hoerner, Theodore R. Robb, Lorin Anderson, Ed Beals, Gordon Mickle, Fred Biederman, Fred R. Lewis, N. D. Wygant, L. G. Davis, Geo. M. List, Ralph J. Gilmore, Miriam A. Palmer, Colorado; Harwood B. Dryer, Richard Lewis Post, New York; R. L. Parker, E. G. Kelly, Roger C. Smith, Kansas; L. H. Shropshire, Wm. P. Hayes, Illinois; Joseph F. Reinhardt, Minnesota; C. L. Farrar, Wisconsin; Paul Knight, Maryland; Ephraim Hixson, Oklahoma.

The following is a list of the more formal subjects discussed:

APICULTURE—The General Research Program of the Intermountain Bee Laboratory, U. S. Bureau of Entomology and Plant Quarantine, Laramie, Wyo., A. W. Woodrow; Resistance of Strains of Bees to American Foul Brood, A. P. Sturtevant; Queen Supersedure, C. L. Farrar.

COLEOPTERA—The Striped Cucumber Beetle on Squash and Melons, J. L. Hoerner; The Wheat White Grub, *Phyllopha lancelata,* E. G. Kelly.

HEMIPTERA—Results in the Control of the Squash Bug, J. L. Horner.

HOMOPTERA—Summer Temperatures and the Tomato Psyllid, *Paratrioza cockerelli* (Sulc), Geo. M. List; Aphid Studies with a Report on Several New Species, Miriam A. Palmer.

LEPIDOPTERA—An Outbreak of the Walnut Datana, 1935-38, Ephraim Hixson; The Celery Stalkworm, *Nomophila noctuella,* Roger C. Smith; Biology and Control of the Strawberry Leafroller, *Ancylis comptana* Froel, R. L. Parker.

ORTHOPTERA — Grasshopper Control Studies; Roger C. Smith; Symposium, The 1938 Grasshopper Program, C. L. Corkins. Discussed by T. R. Robb, Gordon Mickle, Ed Beals,

Fred R. Lewis, Fred Biederman, Fred H. Kropf, T. R. Hupper, Robert Hawkins.

GENERAL—Symposium, The Building of Insect Collections Representative of the Inter-mountain Region; Leaders: Robert Potts, Vasco M. Tanner, Maurice T. James, Don B. Whelan, Roger C. Smith; Preserving Insect Specimens and Preparing Material for Display, R. L. Post; The Castor Bean in Relation to Insects, Roger C. Smith; Effect of Fumigation on Tomato Fruit, C. R. Jones; Insect Control on Truck Crops in Northern Illinois, L. H. Shropshire; Insect Problems in Wyoming, Margaret Greenwald; Some Work of the Nebraska Station, Don B. Whelan; Statistical Methods in Entomology, F. M. Wadley; Bacteriological Work at the Intermountain Bee Laboratory, Herbert J. Stoles, Jr.; Some Problems Being Studied at the Forest Insect Laboratory of the U. S. Bureau of Entomology and Plant Quarantine, N. D. Wygant; Insect Photography for Class Room Use, Paul Knight.

It was voted to attempt to make discussions of forest and shade tree pests a main part of the program in 1939, and if practical to arrange for trips into the surrounding national forests to study the forest insect research programs.

The officers elected for 1939 were C. P. Gillette, Chairman; Vasco M. Tanner, Vice-Chairman; George M. List, Secretary, and C. R. Jones, Treasurer. GEORGE M. LIST, Secretary, Rocky Mountain Conference of Entomologists.

Dr. Eugene Murray-Aaron Convalescing.

It may interest those who remember Dr. Eugene Murray-Aaron as a lepidopterist, who began writing for entomological journals in 1874, to realize from our October number that he is still actively interested and busy at work in the Field Museum, in Chicago. Just now he is convalescing in a hospital from a broken leg due to the speed fever of a careless autoist, and the 86-year bones are successfully knitting together.

He is working on a catalog of the North American Rhopalocera, after the pattern of, and to supplement that of, Skinner, forty years ago, but to be supplied with tables, keys, line and photo illustrations to aid the student in specific identification. His friends will hope his rather unusual physical resiliency may stay with him as long as his mental energy requires.

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(* indicates new genera, species, names, etc.)

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Chrysalids of Papilio ajax and philenor, cocoons of Rothschildia orizaba and jorulla. Buy or exchange. Newark Entomological Society. Curator, Chas. Rummel, Green Village Rd., R. D. 2, Madison, New Jersey.

Have large list of Lepidoptera wants and offers. Send me yours. Carpenter, Box 1344, Hartford, Conn.

Wanted — Specimens of North American Cephidae. Will make determinations and exchanges for purposes of revising the group. Donald T. Ries, Department of Entomology, Cornell University, Ithaca, N. Y.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of Samia nokomis for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange nokomis cocoons for desirable butterflies, Papilio, Argynnis or Megathymus. Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.